PAINT and VARNISH Production

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

SMA AEROSOL
LINIC.... Page 71

ECEMBER
1959
per copy

Which of these roads leads to your plant?

Get fast delivery of quality PVAc emulsions from RCI

Is fast, dependable delivery of quality PVAc emulsions important to your production? Reichhold now ships from eight strategically located PVAc plants and/or bulk storage points — more than any other producer. The plants are located at: Charlotte, N. C. • Elizabeth, N. J. • Jacksonville, Fla. • Kansas City, Kan. • So. San Francisco, Calif. • Toronto, Ont. [Reichhold Chemicals, (Canada) Ltd.] Bulk storage facilities at: Argo, Ill. • Azusa, Calif.

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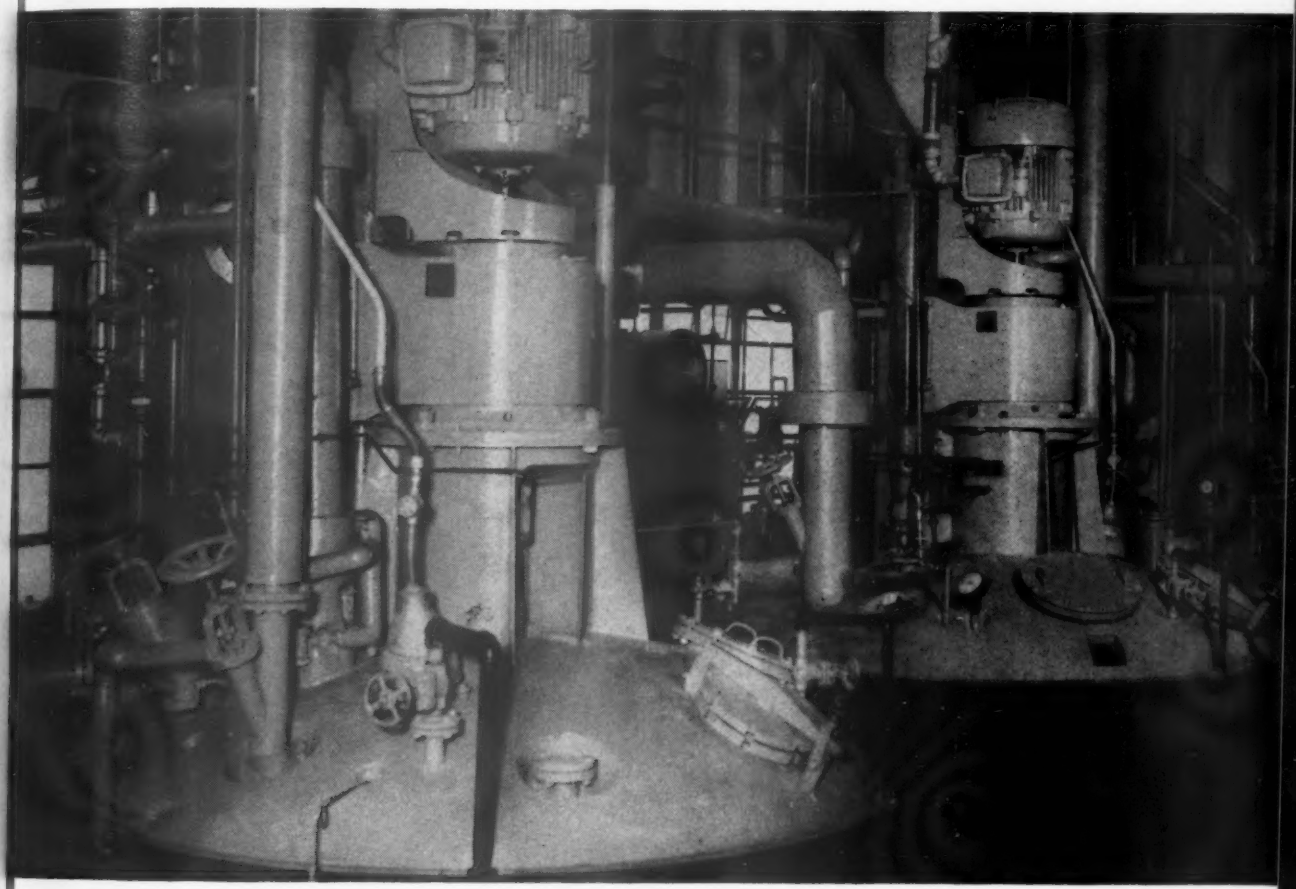
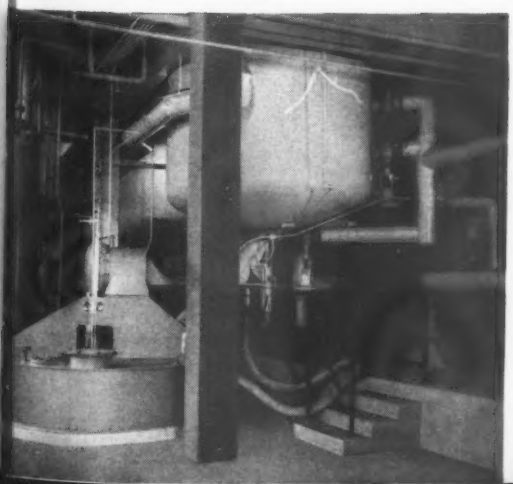


Patterson SYNTHETIC RESIN SYSTEMS



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PAINT and VARNISH PRODUCTION is published monthly except semi-monthly in March at Easton, Pa., by Powell Magazines, Inc., John Powell, president; Ira P. MacNair, vice-president and treasurer; Alice L. Lynch, secretary. Entered as second class matter at Post Office at Easton, Pa., Jan. 30th, 1952, under the Act of March 3, 1879. SUBSCRIPTION RATES POSTPAID: *United States and Canada*, 1 year $4.00; 2 years $7.00. *Mexico and Pan-American Countries*, 1 year $5.00; 2 years $8.00. All other countries, 1 year $8.00; 2 years $15.00. Remit cash in advance, with order, by bankers draft on New York funds. SINGLE COPIES: *Current issue*: $0.50; *all back numbers*: $1.00. Convention issue: $1.00. Bound volumes: $10.00 per vol. when available. We cannot guarantee to supply back numbers and claims for missing numbers cannot be granted if received more than 60 days after date of mailing. Subscribers should promptly notify circulation department of any change in address, giving both old and new addresses and by sending address label. EDITORIAL AND EXECUTIVE OFFICES: 855 Avenue of the Americas, New York 1, N. Y. BRyant 9-0497. Printed in U.S.A.

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Formerly PAINT and VARNISH PRODUCTION MANAGER
(Established in 1910 as The Paint and Varnish Record)

VOL. 49 DECEMBER, 1959 NO. 13

FEATURES

PRODUCTION

FOREIGN DEVELOPMENTS

DEPARTMENTS

Paint and Varnish Production Wishes You
A Merry Christmas and a Happy New Year

News of the year for Epon® resin users!

- **100% Epon resin solids application**
- **15 mils thick—one coat**
- **Conventional spray equipment**

Use your present equipment to spray 100% resin solids in applications of up to 15 mils thick on a flat or vertical surface! Sounds impossible? It was . . . until Shell Chemical developed two new Epon resin curing agents, H-1 and H-2.

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GET IN ON THE GROUND FLOOR of this important new development by contacting your nearest Shell Chemical district office right now. Write or phone the one nearest you. Ask for complete information on Epon resin curing agents H-1 and H-2.

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IN CANADA: Chemical Division, Shell Oil Company of Canada, Limited, Toronto

SHELL

EDITORIAL COMMENT

What's In It For Me?

WHAT'S the costliest boner being made by salesmen today? "Not selling from the customer's viewpoint." That's the majority opinion of more than 800 sales chiefs interviewed by Ted Pollock, noted writer on selling.

A self-centered, rather than customer-centered, approach in the selling process is the most committed sin in selling today, say the experts. Their consensus: "Salesmen bark up the wrong tree. They talk products, instead of what these products will do for the buyer. They sell product features, instead of customer benefits. They plug what interests the salesman, instead of what interests the customer. They leave unanswered the one motivating question in every buyer's mind: "What's in it for me"?

Todays modern paints have many "what's in it for me" features beyond protecting and beautifying home and property. For example, paint helps keep the home cool in the summer; reduces waxing of the automobile; it rids basements of dampness and mildew; it helps safe driving, especially at night; through the use of color, it can help reduce tension; and it can help reduce noise.

What Are Your Feelings?

IN this month's "Coating Corner" (page 55), Phil Heiberger comments on the recent Federation Meeting in Atlantic City.

The nub of Mr. Herberger's remarks is his concern over the vast number of meetings, symposia, and lectures held during the three-day meeting—making it increasingly difficult for those attending to get the most out of the convention.

Since the members of the Federation have a diversity of interests, Mr. Heiberger suggests that the technical discussions might be broken down into various areas of interests such as technical service and sales, testing and quality control, production, formulation, research, purchasing and administration rather than have each presentation appealing to every member of every group every time.

Obviously there is no immediate solution to the above problem, but Mr. Heiberger makes some worthwhile suggestions which merit your consideration. Meanwhile, whatever may be your sentiments let us have your reaction to Mr. Heiberger's ideas.

Scented Paints

THERE is a good possibility that citrus peel oil may find some use in manufacturing paints. The O'Brien Corporation of South Bend is currently investigating the use of dextrorotary Limonene, an extract of orange peel, in a variety of paint products. According to O'Brien, this material has excellent solvent power for oleo-resinous materials and its evaporation rate is close to ideal for brush applied paints. It replaces turpentine volume for volume and leaves the film entirely in 24 hours without residual "paint odor". During the evaporation time, the volatiles give off a very acceptable aroma of citrus fruit.

With the classic bowl games coming up on New Years day, we couldn't think of a better place to use such a paint than the Orange Bowl in Miami. Oops, lest our California friends become jealous, has anyone developed a paint having the aroma of roses?

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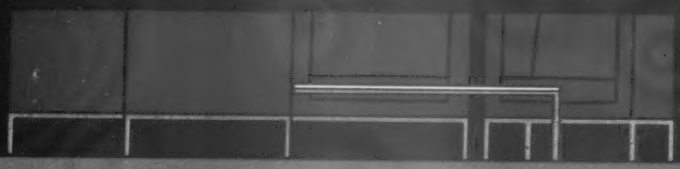

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as an ingredient in more potent paint removers

for inks, adhesives, leather finishes, insecticides, pharmaceuticals and other compounds

Photo courtesy Sapolin Paints Inc., New York, N. Y.

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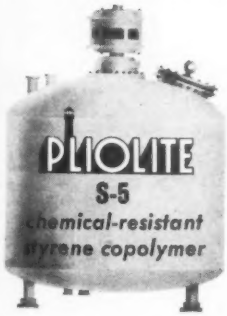

GOODYEAR
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WITCARBS®

SAVE 4¢ to 9¢

on every gallon of paint!

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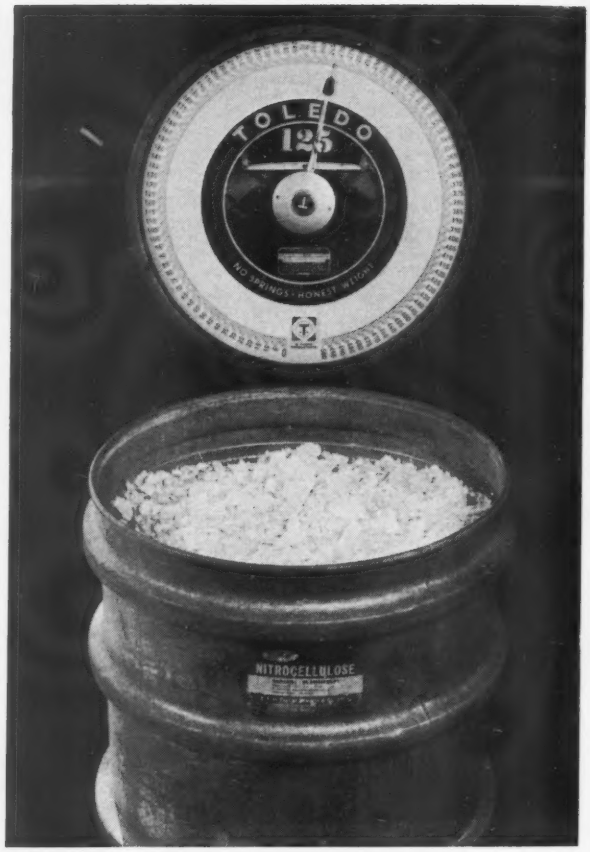

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Just **tip and pour.** Because of its greater density, this new nitrocellulose is free-flowing and easy to handle.

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. . . extends silicones in heat resistant aluminum paints!

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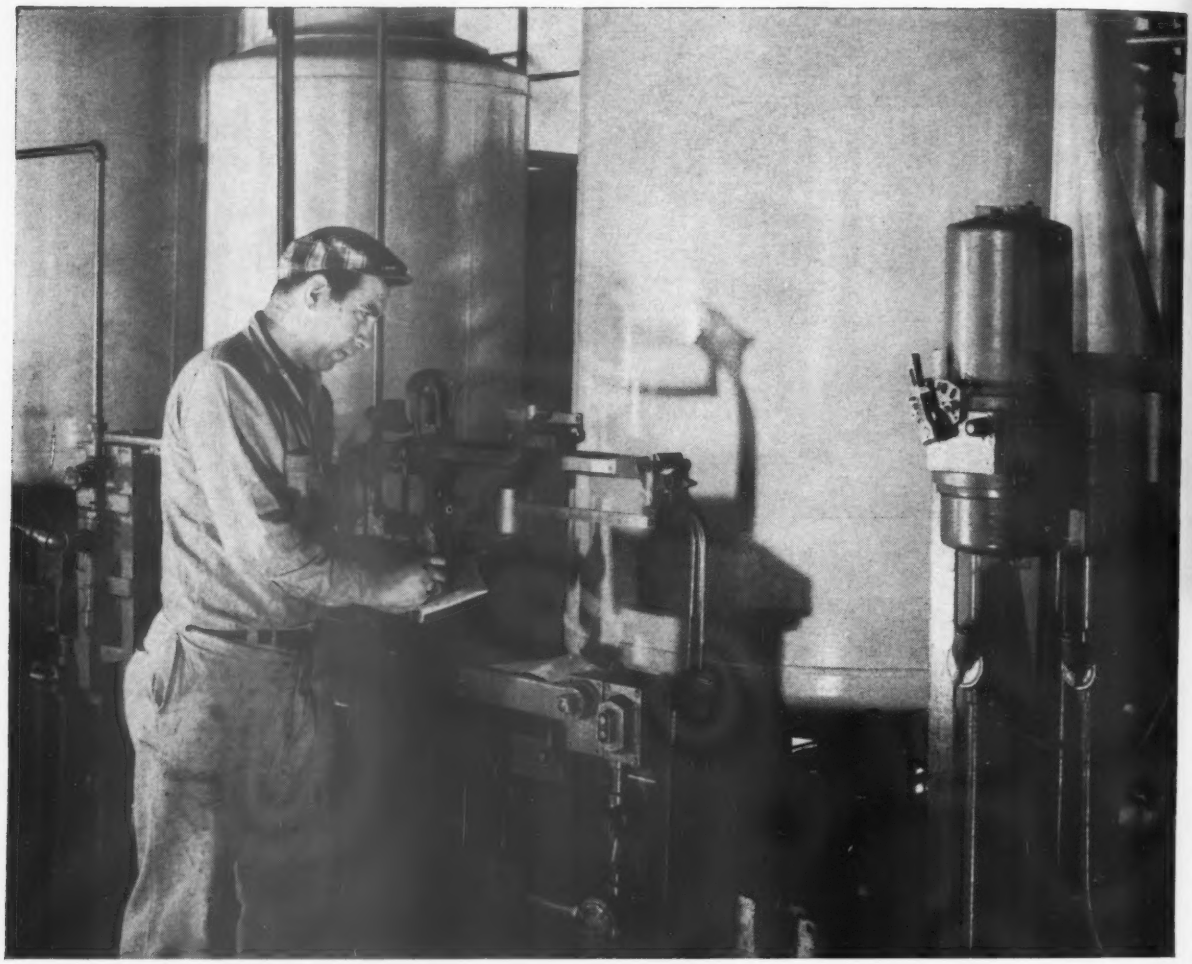

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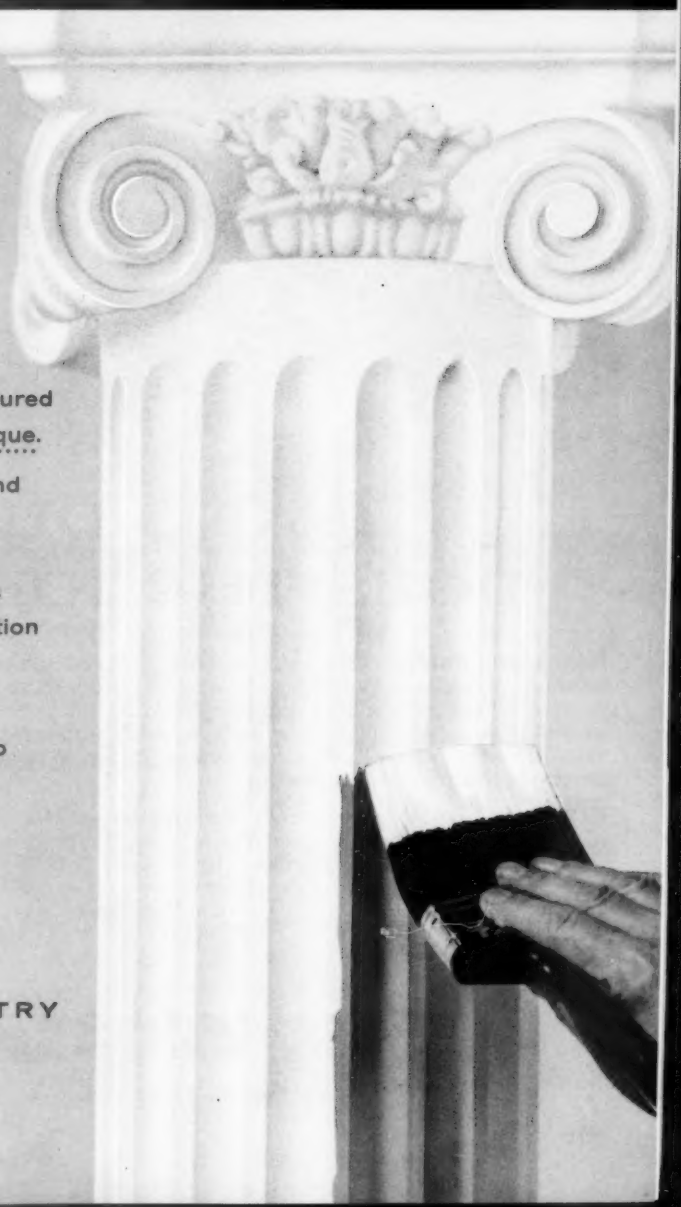

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Isano-based paint will blister under heat, forming a layer of insulating air that protects surface, retards charring.

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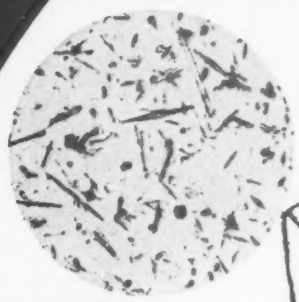

AZO ZZZ-22
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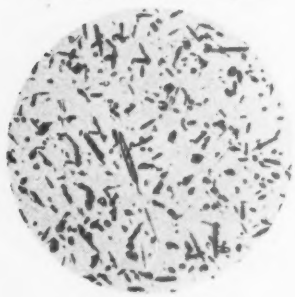
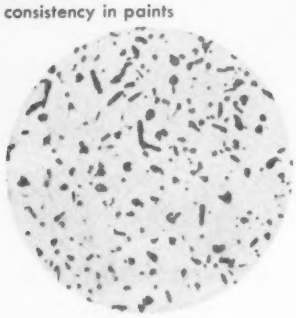


AZO ZZZ-11
for medium consistency in paints



AZO ZZZ-33
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Whether it's high, medium or low, you'll find there is a particular grade of AZO zinc oxide to meet your needs exactly. And, when necessary, we can select within grades the exact degree of desired oil absorption.

AZO acicular lead-free zinc oxide is a superior pigment that will give extra durability, finer weathering qualities to your paints.

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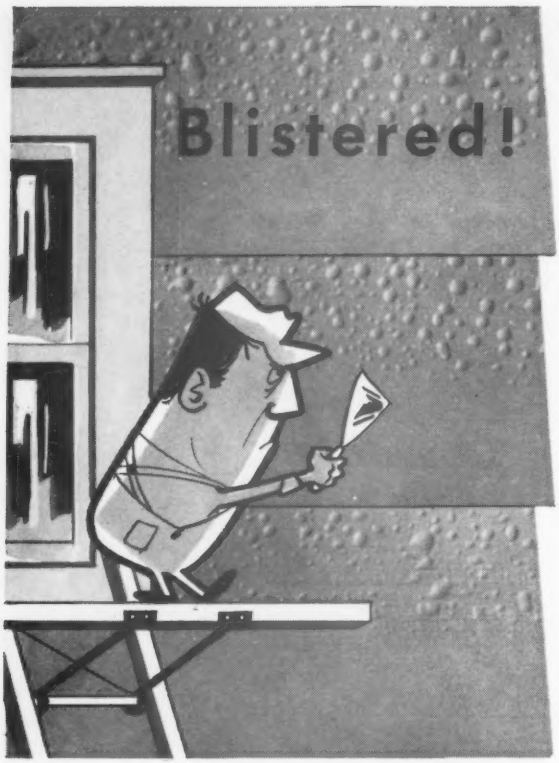

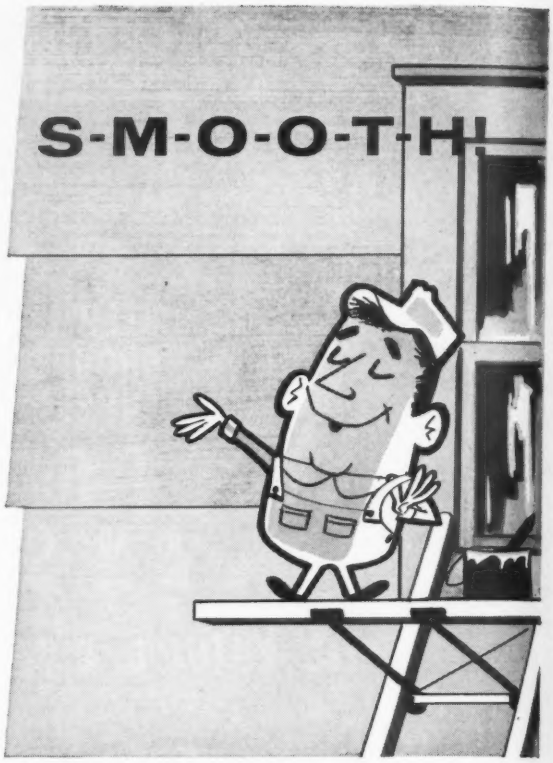

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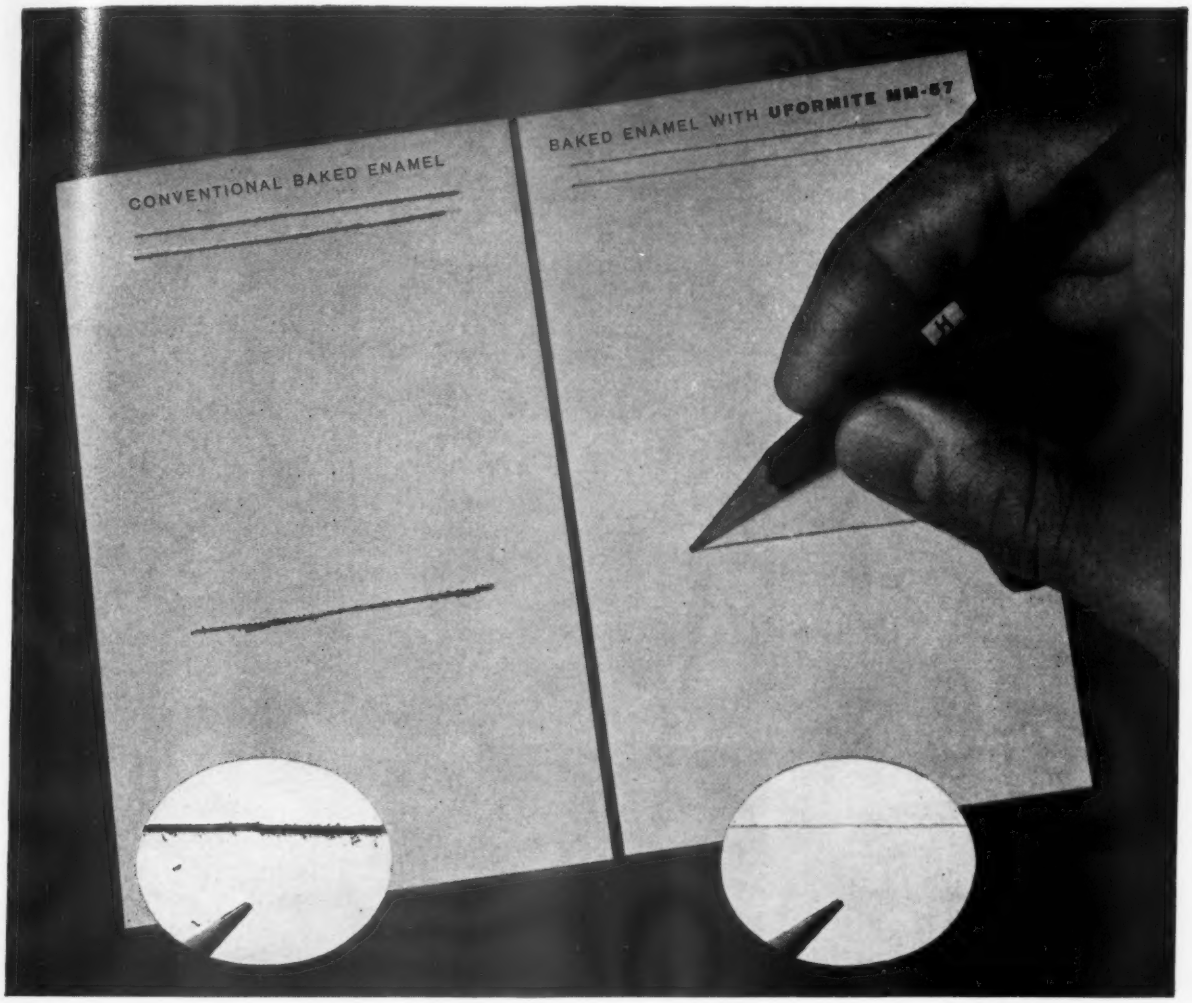

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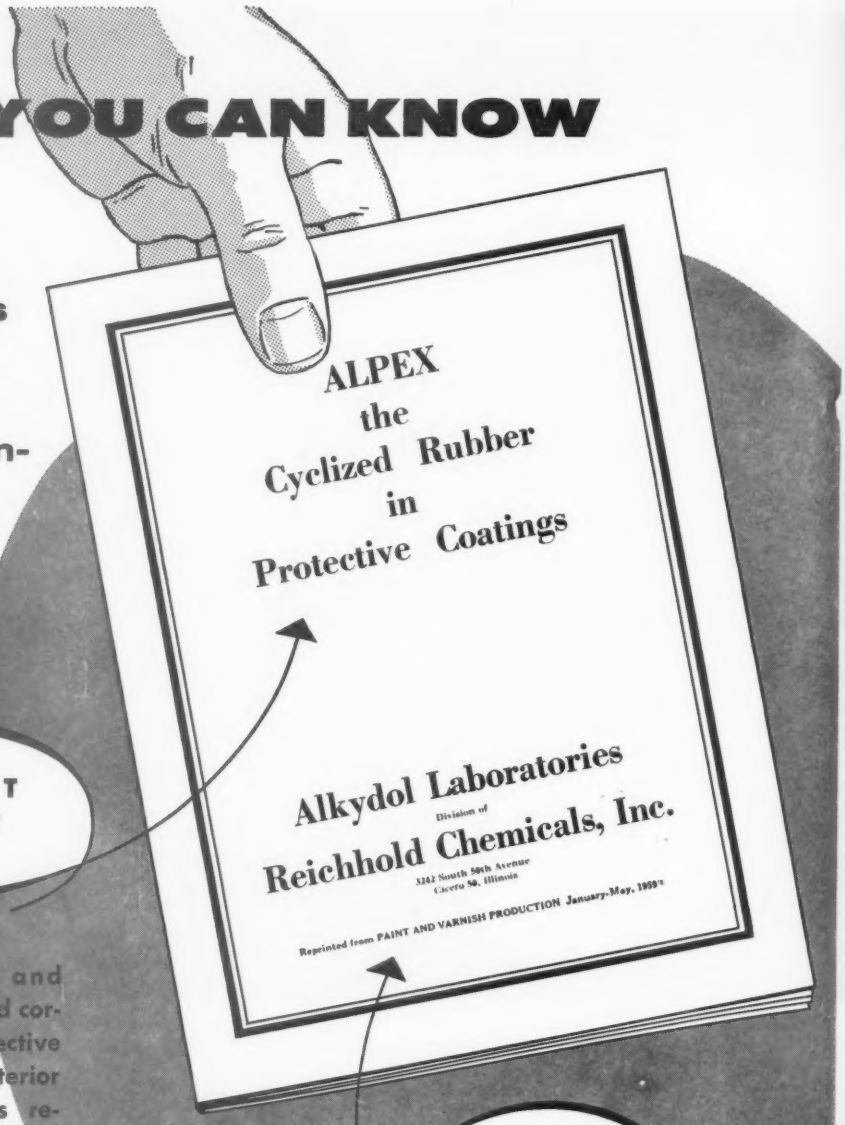

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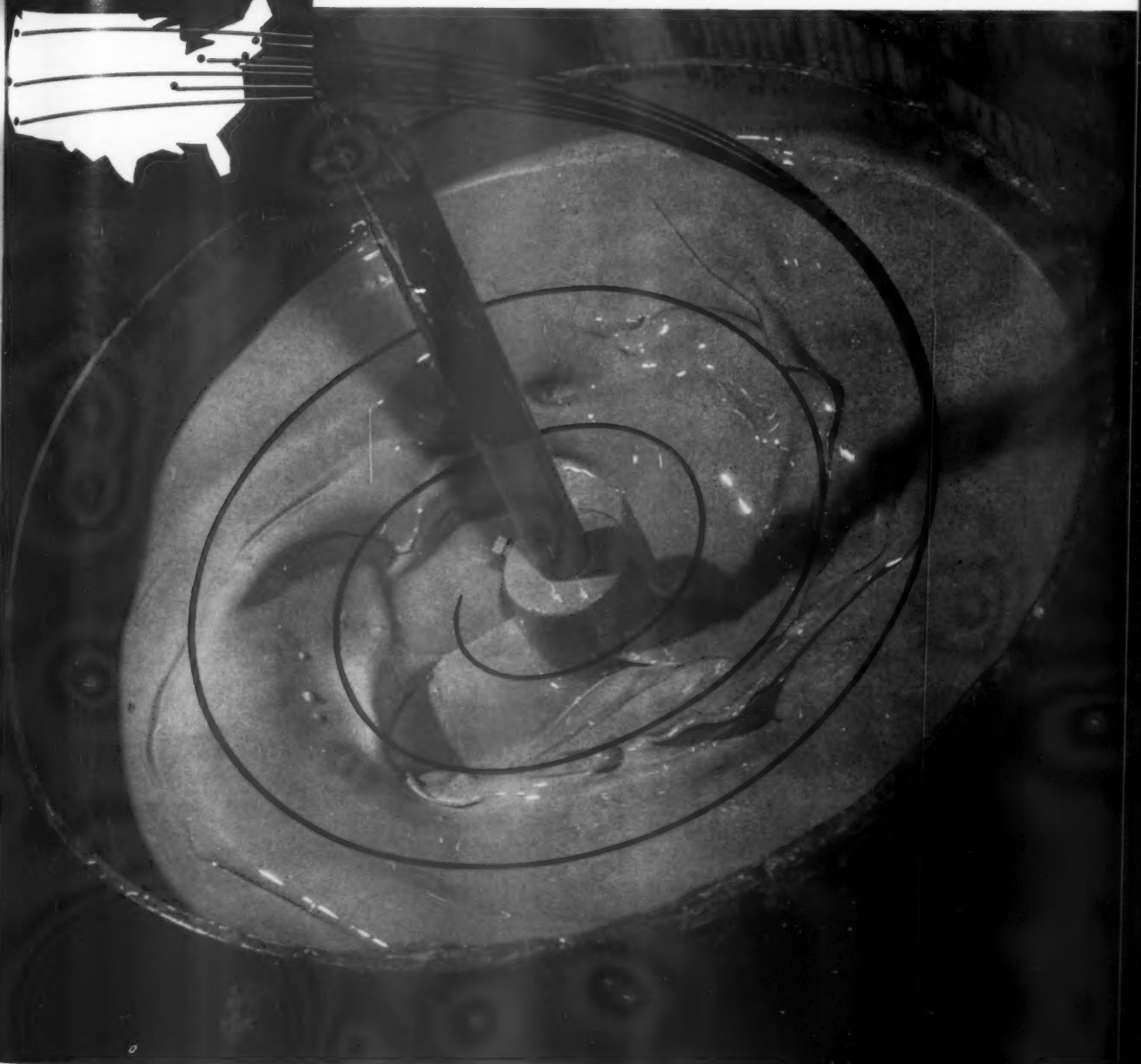

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Effect of Pigment Particle Shape and Size on . . .

MOISTURE PERMEABILITY of ORGANIC COATINGS

By
Dr. Max Kronstein Julio Rivera
Herman Abramski Fred Weber

THIS paper is concerned with studies on the influence of particle shape and size on the film characteristics of organic coatings, especially with respect to their moisture sealing characteristics. This discussion is not concerned with the so-called reactive pigments, where chemical inter-reactions take place between the vehicle and the pigment, such as in the case of certain lead pigments which have the tendency to form lead soaps at the pigment surface. Also, it is not concerned with reactive paints where the pigmented paint inter-reacts also with the coated metal surface. (These paints were discussed by the author at the Fall 1958 Northeast Regional Corrosion Conference of the National Association of Corrosion Engineers in Boston.[1]) The paper is concerned primarily with the effect of not reactive pigments, such as titanium dioxide and extenders of different particle shapes and sizes; however the addition of acicular zinc oxide has been used as one of the components in two of the experimental paints.

These pigments can not be assumed to act primarily as a chemically reactive component in the film formation. They are rather passive materials in this chemical process. The pigments are dispersed first in the vehicle and are applied as part of the pigment-vehicle system. As the volatile matter escapes and the vehicle is chemically changed into its film form, these particles are "closed in" or "pressed together" into the film as filler material. As a result the completed film represents a kind of net work of the chemical film components and the filler. It is to be expected, therefore, that very small circular pigment particles will pack together more uniformly than irregularly shaped pigments, if in both cases the same amount of pigment and vehicle are used. The object of this study is to determine to what extent the pigment shape and size variations will have on the film properties of vehicles.

It was necessary, therefore, to select certain pigments and vehicles avoiding those vehicles which had components which dominated the final film properties. Methods for studying the characteristics of the test paint films were selected. These methods involved moisture penetration studies; i.e., studying the blistering of applied coatings. The methods consisted also of comparative studies on the amount of light falling through the test films (light applied to glass and illuminated from the underside of the glass panels). Other studies included water vapour permeability of test films when tested as free films over a vessel containing water. Additional studies were also made on the effect which other components in the same film might have on the sealing effect of the pigmented film, and how far the sealing effect of a given pigment can be chemically modified and the effect this surface modification will have on the film. Ultimately, some comparisons were made between the results of the water vapour permeability of selected paint films and their behavior on steel panels under saltfog exposure.

The studies of this investigation were carried out with white paints. Rutile titanium dioxide was used

The authors are associated with the Research Div., College of Engineering, New York University, University Heights, N. Y.

as one of the hiding pigments; in some cases jointly with acicular zinc oxide. The extenders were selected from two groups: the fibrous magnesium silicate (3X) and the platy wet-ground mica. The sizes were further modified by using the platy mica material either as 325-mesh matter, or in "micronized" form as 1000-mesh and as 3000-mesh size, or in the form of mixtures between these sizes. One additional modification has also been included in these studies: the effect of a decrease of the water vapour behavior of the mica pigment by chemically reacting the surface first in a form of "siliconizing" process.

In order to collect data which were typical for these pigmentation characteristics and not dependent on one specific vehicle as film former, several vehicles were included in these studies. They consisted of two different forms of latices, polyvinyl-acetate latex and styrene-butadiene latex, and two different forms of alkyd paints, an alkyd paint and a vinyl-alkyd paint.

Test Methods and Their Application

Testing moisture penetration by the blistering of applied coatings was carried out in the following manner:

The test set-up for exposure to moisture consisted of an exposure box, which was in principle similar to the blister box for house paint of Circular 772, Scientific Section, National Paint, Varnish and Lacquer Association. This was constructed from a five-gallon can 13.5 inches high and 9 inches on each side. Openings 4 x 6 inches in size were cut in the four vertical sides of the box. These were later covered by the shingles with the test paints, which were held in place by two wooden braces each, screwed to the test box. To avoid the escape of moisture, a rectangular frame of sponge rubber was placed between the metal box and the test shingle. The test shingles were 8 x 12 inches in size. Inside of the box an immersion heating coil was installed. The heating circuit included a Variac whereby the temperature in the box could be maintained at 59°C. This corresponded under the test conditions to a Variac position of 50. The water level in the test box was maintained at 4 inches. The immersion coil heated the water, but the temperature of 50°C. refers to the temperature of the vapour in the box.

This test set-up was used in studying polyvinyl-acetate latex paint system on cedar shingles. In order to trace the effect of the pigment shape and size in this system the same paint was used with four pigment variations. The composition of the test paints is shown in Table 1. Paint #1 differs from the other three paints, since this paint contains platy 325-mesh mica as well as fibrous magnesium silicate. The other three paints have mica as the only extender: in Paint #2 the ratio between titanium dioxide and extender is the same as in Paint #1; in Paints #3 and #4 the total weight of the hiding pigment and extender pigment is kept constant, but the ratio is varied between titanium dioxide and mica. In Paint #4 the amount of mica was so high a ratio to the titanium dioxide component that an increased water content was required, due to the higher water sorption value of the mica pigment.

The paints were first applied to one side of the shingles only. But the amount of moisture which

THE TEST PAINTS WERE PREPARED USING THE FOLLOWING FORMULATION:

	PAINT # 1 EXTENDER: 25 p.Mica 25 p.Magn.sil.	PAINT # 2 50p.Mica	PAINT #3 75 p.Mica in 325 p. Pigment	PAINT #4 125 p Mica
A. THE FLUID FOR THE FIRST MIX:				
WATER	79.5	79.5	79.5	79.5
DISPERSING AGENT: LECITHIN water dispersible	3.25	3.25	3.25	3.25
DEFOAMER: Nopco 1707-A	1.5	1.5	1.5	1.5
ORGANIC SOLVENT: CARBITOL	20.0	20.0	20.0	20.0
FREEZE STABILIZER: ETHYLENE GLYCOL	15.0	15.0	15.0	15.0
FUNGIZIDE : DOWICIDE G, 10% solut.	20.0	20.0	20.0	20.0
METHYL-CELLULOSE, 4000 cps, 2% solut.	80.0	80.0	80.0	80.0
B. THE PIGMENT:				
RUTILE TITANIUM DIOXIDE (RANC)	275.0	275.0	250.0	200.0
MAGNESIUM SILICATE (3X)	25.0	-	-	-
WET GROUND MICA , 325 mesh	25.0	50.0	75.0	125.0

PART A AND B WERE DISPERSED ON THE 3-ROLLER MILL AFTER MIXING AS A PASTE FOR 30 MINUTES.

C. THE PAINT LET-DOWN:				
METHYLCELLULOSE, 4000 cps, 2% sol.	100.0	100.0	100.0	100.0
LECITHIN, water dispersible	5.0	5.0	5.0	5.0
POLYVINYL ACETATE LATEX, preplasticized, 47.7% solids	356.0	356.0	356.0	356.0
METHYL-CELLULOSE, 4000 cps, 2% sol.	100.0	100.0	100.0	100.0
WATER	54.0	54.0	54.0	154.0

Table 1. Composition of the polyvinyl acetate test paints.

ON CEDAR SHINGLES: BLISTERING TESTS

I. THE EXTENT OF BLISTERING WITH PAINT APPLIED ON ONE SIDE ONLY :

PAINT #	EXTENDER	EXTENT OF BLISTERING AFTER TWO DAYS Square inches
1.	25 p.PLATY MICA, 325 mesh 25 p.FLAKY MAGNESIUM SILICATE	18.20
2.	50 p.PLATY MICA, 325 mesh	7.75
3.	75 p.PLATY MICA, 325 mesh	16.50
4.	125 p.PLATY MICA, 325 mesh	20.00

NOTE: AFTER 1 WEEK EXPOSURE ALL SHINGLES SHOWED BLISTERING OVER THE FULL AREA WHICH WAS EXPOSED TO THE TEST.

II. THE EXTENT OF BLISTERING WITH PAINT APPLIED ON BOTH SIDES :

(SAME TEST PAINTS AS IN I.)

PAINT #	AREA OF BLISTERS AFTER DAYS OF EXPOSURE (TEST UP TO 12 DAYS) DAYS 2	4	6	8	10	12 (IN sq.in)
1.	NO BLISTERS	SLIGHT BLISTERING 0.75 sq.in.	4.00	4.50	5.30	5.50
2.	NO BLISTERS	0.98	1.90	1.90	2.10	2.10
3.	NO BLISTERS	NO BLISTERS	NO BLISTERS	NO BLISTERS	NO BLISTERS	NO BLISTERS
4.	2.00	4.00	17.50	18.50	20.00	20.00

Table 2. Moisture sealing tests of polyvinyl acetate latex paints.

penetrated into the unprotected side of the shingles, when they were attached to the test box, was so great that variations between the test pigmentations did not appear clearly in the test results (Table 2-I). Therefore, both sides of test shingles were coated, thus requiring the moisture to penetrate through the one paint film into the wood and then the other paint film. This slowed down the rate of blistering considerably and measurements of the resulting blistering could be made (Table 2-II).

The test results show that the pigment variations do have a considerable effect on the extent of blistering. In comparing Paints #1 and #2, which have a constant

ratio by weight of titanium dioxide and extender pigment, it is observed that the introduction of the increased amount of platy 325-mesh mica decreased the rate of moisture penetration through the wood in the one-side application and in the two-side applications. Further increase in the ratio of the platy extender to the titanium dioxide decreased the sealing characteristics in the one-side application but still further increased the resistance in the two-side application. Proceeding to the extreme ratio between titanium dioxide and extender in Paint #4, with the simultaneous increase in water content of the paint and with the resulting decrease in the dry-film thickness, caused a considerable decrease in the sealing effect. This test group, therefore, confirmed the theoretical expectation of the influence of varying pigment shapes and sizes on the resulting film.

In a second approach comparative studies were made on the transparency of the test films. The aim was to measure to what extent variation of the particle shape and size of the extender influences the density of the film in a detectable manner when the light transparency of the test film is used as a criterion for the condition of the film. To compare the paints, a test set-up was built around a 100 Watt frosted light bulb providing for fixed positions for four glass test panels equidistant from the light source. The aim was to provide the same light distribution on each of the glass panels to which test paints has been applied. The paint was applied to one side of the panels when one coat of paint was used, and to both sides when two coats were used. The paint was applied using a film applicator. Test panels were prepared using the 3 mil applicator on one side of the glass, and again using the same applicator on both sides of the panel. Also, panels were prepared using the 6 mil applicator on one side only.

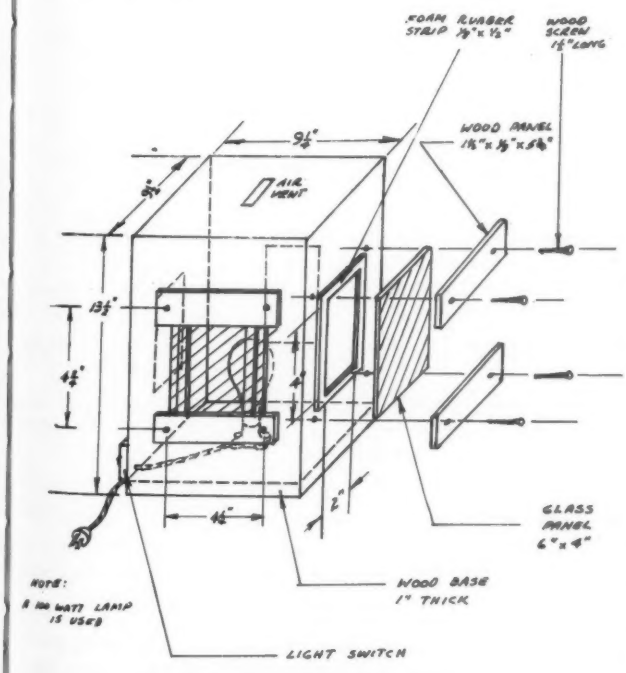

Figure 1. Light exposure cabinet.

TEST PAINT	H-1	H-2	H-3	H-4	H-5	H-6
A. THE GRIND						
THE VEHICLE:						
ALKYD RESIN, 50% SOLIDS (SHORT OIL ALKYD WITH CASTOR OIL BASE: AROPLAZ 2480)	500	500	500	500	500	500
NAPHTHENATE DRIERS:						
COBALT 6%	2.4	2.4	2.4	2.4	2.4	2.4
LEAD 24%	1.6	1.6	1.6	1.6	1.6	1.6
CALCIUM 5%	0.5	0.5	0.5	0.5	0.5	0.5
THE PIGMENTS						
TITANIUM DIOXIDE, RUTILE (TiPure R-110)	400	400	400	400	400	400
FLAKY EXTENDER: MAGNESIUM SILICATE (3X)	300	150	150	150	150	150
PLATY EXTENDER: MICA						
325 mesh, WET GROUND	-	150	-	-	75	-
MICRONIZED: 1000 mesh	-	-	150	-	75	75
MICRONIZED: 3000 mesh	-	-	-	150	-	75
B. THE LET-DOWN, AFTER PASSING THE THREE ROLLER MILL TWICE.						
XYLOL	160	182	177	186	185	196
VISCOSITY, cps	720	740	720	730	750	720

Table 3. Alkyd paints used in experimental studies.

The basis of the test is to compare the extent to which such a paint film will "insulate" the surface against the penetration of the light energy from the source through the paint film to the outside. Obviously, the densest film would allow the least light to penetrate. The test set-up is shown in Figure 1. To measure how much light penetrated each of the white paints on the glass panels, the search unit of the Photovolt Photoelectric Reflection Meter, Model 610 was used. This unit was pressed flat and uniformly against the outside of the illuminated panel, using the tri-green filter in this unit. With an increase of transmitted light, the effect on the search unit is the same as when applied to whiter, or more reflecting, panels. Parallel readings on the outside of the non-transparent surfaces were also made.

For these tests, alkyd paints were used because such paints have been found to produce denser films than the latex paints. The composition of these alkyd paints is given in Table 3. Paints were selected in this manner in order to produce films, with varying extender composition, whose surface reflectance or whiteness when measured by infalling light would not vary greatly. Therefore, the formulation maintains the same amount of titanium dioxide and of extender. Between Paint H-1 and the other paints there is a variation in the amount of fibrous extender and the amount of mica present; but in all other test paints only the particle size of the mica, or the mixture of mica particle sizes in the paint, is varied. Table 4 gives the results of reflectance readings of Paints H-1 to H-6 on glass panels, when the search unit was set on the panels without illumination from the back, and again when the panels were illuminated from the back. The data show that the reflectance readings of the paints which were not illuminated from the back were all quite similar; but when the same panels were illuminated from the back the paints showed considerable variation. Paint H-1 and H-2, which showed quite close agreement under the infalling light, revealed a 17% difference when illuminated from the back, when the panel had one 3 mil film of paint, or 25% difference when one coat had been applied on

I. THE REFLECTANCE READINGS WHEN THE SEARCH UNIT OF THE INSTRUMENT (PHOTOVOLT MODEL 610) IS SET ON THE PANEL WITHOUT ILLUMINATION FROM THE BACK (WITH TRI-GREEN FILTER)

PAINT #	REFLECTANCE READING
H-1	85.6
H-2	86.0
H-3	85.2
H-4	85.3
H-5	84.1
H-6	85.1

II. THE READINGS UNDER THE EFFECT OF THE TRANSMITTED LIGHT:

(AFTER SETTING THE INSTRUMENT AT 50 FOR H-1 FOR COMPARATIVE READINGS.)

PAINT #	PLATY MICA SIZE	READING	DIFFERENCE TO H-1 IN %
	USING ONE COAT OF PAINT (3 mil BIRD GAGE)		
H-1	-	set to 50	-
H-2	325 mesh	Reading 41.5	- 17%
H-3	1000 mesh	50	-
H-4	3000mesh	44.5	- 11%
H-5	325 and 1000 mesh	31	- 38%
H-6	1000 and 3000 mesh	48.5	- 3%
	USING ONE COAT OF PAINT (3 mil BIRD GAGE) TO EACH SIDE		
H-1	-	set to 50	-
H-2	325 mesh	Reading 37.5	- 25%
H-3	1000 mesh	43.0	- 14%
H-4	3000 mesh	40.0	- 20%
H-5	325 and 1000 mesh	35.5	- 29%
H-6	1000and 3000 mesh	42.0	- 16%
	USING ONE HEAVY COAT OD PAINT (6 mil BIRD GAGE)		
H-1	-	set to 50	-
H-2	325 mesh	Reading 44.5	- 11%
H-3	1000 mesh	51.2	-
H-4	3000 mesh	46.9	- 6.2%
H-5	325 and 1000 mesh	43.5	- 13%
H-6	1000 and 3000 mesh	48.5	- 5%

Table 4.

each side of the panel. This indicates a denser film formation in the case of Paint H-2 with its more complex pigment shape and size system.

Especially interesting is Paint H-5, which contained an additior al particle size variation by using mica in two sizes— one of them still the large particle sized 325-mesh mica—this showed greatest decrease in illumination. When the large particles were not used at all, as in Paint H-6, the optical density of the film decreased. This test group confirms the fact that the variation of pigment shapes and sizes influence the state of the film.

It was of interest to compare the light transmittance readings with water vapour permeability tests. These were made after producing free fiilms of the test paints by first applying the paints with a 6 mil film applicator to glass plates. After drying, the films were loosened from the glass by immersing the glass panels in a water solution of tribasic sodium phosphate. The films were then lifted off, washed in fresh water and dried on absorbent paper. The free films were than mounted over the open end of glass beakers containing weighed amounts of water, after applying a sealing ring of petroleum jelly to the beakers and to the film where it joined the beakers. Table 5 gives data on the amount of water lost in vapour form through these films during a 17 day observation period, and the calculation in percent of loss as it progressed during this period. It shows also a value for the average loss, in percent, obtained for each day during the 17 day period of observation.

The results show that there is some interesting agreement between the earlier transmittance readings and the water vapour transmittance readings. This is shown in Table 6. In view of the wholly different test conditions, no full agreement of the percent difference was to be expected. But the general sequence of the

THE WATER LOSSES THROUGH THE FREE FILM SEAL (AT 75 -80 F)

TEST	HA-2	HA-3	HA-4	HA-5	HA-6
INITIAL WATER WEIGHT:	10.4560 g	10.1144 g	10.7644 g	10.0995 g	10.0845 g
LOSS AFTER: 1 DAY	0.1177 g 1.12%	0.1368 g 1.35%	0.1389 g 1.35%	0.1017 g 1.01%	0.1583 g 1.57%
AFTER 3 DAYS	0.1770 g 1.72%	0.2533 g 2.54%	0.2098 g 2.05%	0.1322 g 1.32%	0.2365 g 2.39 %
AFTER 6 DAYS	0.2983 g 2.95%	0.4265 g 4.38%	0.3538 g 3.55%	0.2285 g 2.31%	0.4003 g 4.15%
AFTER 8 DAYS	0.1734 g 1.76%	0.2532 g 2.79%	0.2067 g 2.16%	0.1337 g 1.39%	0.2295 g 2.46 %
AFTER 10 DAYS	0.1413 g 1.46%	0.1984 g 2.20%	0.1629 g 1.81 %	0.1098 g 1.15%	0.1835 g 2.03 %
AFTER 15 DAYS	0.4114 g 4.21%	0.6050 g 6.85%	0.4938 g 5.41 %	0.3323 g 3.55%	0.5418 g 6.12 %
AFTER 17 DAYS	0.1464 g 1.60%	0.2220 g 2.69%	0.1770 g 2.04%	0.1197 g 1.32 %	0.1936 g 2.32 %

CALCULATED TOTAL LOSSES

TEST : MICA :	HA-2 325-mesh	HA-3 1000-mesh	HA-4 3000 mesh	HA-5 1:1 325/1000	HA-6 1:1 1000/3000
LOSS IN:					
1 DAY	1.12%	1.12%	1.35%	1.01%	1.57%
3 DAYS	2.83%	3.81%	3.38%	2.32%	3.92%
6 DAYS	4.72%	7.96%	6.84%	4.58%	7.80%
8 DAYS	6.38%	10.44%	8.86%	5.90%	10.17%
10 DAYS	7.73%	12.41%	10.42%	6.99%	12.00%
15 DAYS	11.67%	18.25%	15.20%	10.29%	17.36%
17 DAYS	13.07%	20.40%	16.97%	11.46%	19.29%
AVERAGE LOSS IN % FOR 1 DAY:	0.77%	1.20%	1.00%	0.674%	1.13%

Table 5. Alkyd paints containing mica of varying particle size.

data indicates that both test approaches are dependent on the internal effect of the particle size of the platy components. The larger platy particles of the 325-mesh mica have, in both cases, a stronger sealing effect than the smaller sizes; but the mixture of the larger sizes with the smaller size 1000-mesh mica has an even greater sealing effect. If only very small sizes are mixed, as in H-6, the sealing effect again decreases.

Free Film Permeability Measurements

Additional studies were made of free film permeability measurements. The systematic modification of the water vapour permeability of paint films was applied to styrene-butadiene latex paint films. In this investigation two additional factors have been taken into consideration: one is the water solubility of the additives in the latex paint, in particular the dispersing agent; and the other is the surface modification of the mica pigment. This means that in this test series a latex paint was formulated, using rutile titanium dioxide with zinc oxide and barytes as pigmentation

..T #	MICA SIZE	DIFFERENCE IN THE EFFECT OF THE LIGHT TRANSMITTANCE ON THE SEARCH UNIT, CALCULATED USING H-2 AS 100 %		DIFFERENCES IN THE WATER VAPOR LOSSES, CALCULATED FOR H-2 AS 100 %	
		CALCULATED FROM THE READING	CHANGE AGAINST H-2	CALCULATED FROM THE READING	CHANGE AGAINST
H-2	325 mesh	Used as 100	-	used as 100	-
H-3	1000 mesh	56	minus 44	155.8	plus 55.8
H-4	3000 mesh	80	minus 20	130	plus 30
H-5	325 and 1000 mesh	126	minus 16	87.5	minus 12.5
H-6	1000 and 3000 mesh	64	minus 36	146.7	plus 46.7

Table 6. Effect of varying particle size on light transmission and on water vapor losses. See preceding tables for data used in these calculations.

SAMPLE	L -1	L -2	L -3	L -4	L -5
PIGMENT DISPERSION	g	g	g	g	g
WATER	147.0	147.0	147.0	147.0	147.0
DISPERSING AGENT (TAMOL 731, 25%)	7.5	7.5	-	-	-
SURFYNOL 102 (20% in Alcohol)	5.0	5.0	5.0	5.0	5.0
TITANIUM DIOXIDE, RUTILE(RA-NC)	149.5	149.5	149.5	149.5	149.5
BARYTES	130.5	-	-	-	-
ZINC OXIDE	93.0	-	-	-	-
BEN-A-GEL	0.8	0.8	0.8	0.8	0.8
WET GROUND MICA					
Standard 325 mesh	-	223.0	223.0	-	-
Special 325 mesh	-	-	-	223.0	111.0
325 mesh siliconized	-	-	-	-	111.0
LAY LOCK					
SOYBEAN LECITHIN, Water dispersible	-	-	7.5	7.5	7.5
STYRENE BUTADIENE LATEX(Dow 566, 46% N.V.)	541.0	541.0	541.0	541.0	541.0
EMULSIFIER (Triton X-100,25% N.V.)	10.0	10.0	10.0	10.0	10.0
THICKENER(Methocel 50 cps, 5% N.V.)	20.0	20.0	20.0	20.0	20.0
MAGNESIUM ACETATE 10% N.V.	20.0	20.0	20.0	20.0	20.0
CITRIC ACID(10% N.V.)	6.0	6.0	6.0	6.0	6.0
ADDED WATER	30.0	-	-	-	-
VISCOSITY in cps	50	48	53	56	36
DRYING TIME (1.5 mil min film applied to glass - to dryness)	15.5	14.5	12.0	18.0	11.5

Table 7. Composition of styrene-butadiene latex test paints.

and a water solution of a dispersing agent (Paint L-1 of Table 7), and comparing it with the same paint formulation but replacing zinc oxide and barytes by 325-mesh mica and using the same water soluble dispersing agent (Paint L-2 of Table 7.).

The water vapour losses, which were determined by the same test procedure as was described earlier in this paper, are shown in Table 8. The test results are plotted in Figure 2. They show that introducing the platy mica material decreased the water vapour losses by 22.2%. By now replacing the water solution of a dispersing agent by a water dispersion of a non water soluble soybean lecithin, as in Paint L-3, and maintaining the mica content, the water losses were again decreased. Using 325-mesh wet ground mica of two

TEST	L -1	L -2	L -3	L -4	L -5
INITIAL WATER :	g 9.9899	g 10.0310	g 9.9764	g 10.0308	g 10.0334
LOSS AFTER					
7 DAYS :	0.4195 g	0.3713 g	0.3782 g	0.3808 g	0.1590 g
or :	4.20%	3.70%	3.79%	3.79%	1.58%
11 DAYS :	0.6999 g	0.6294 g	0.6061 g	0.5858 g	0.2251 g
or :	7.01%	6.26%	6.08%	5.83%	2.25%
35 DAYS :	2.0876 g	1.7820 g	1.3304 g	1.3104 g	0.5145 g
or :	21.0%	17.3 %	13.35%	11.80%	4.98%
49 DAYS :	3.0686 g	2.3877 g	1.6911 g	1.6773 g	0.7032 g
or :	30.7%	23.70%	17.05%	15.75%	8.05%
CALCULATED LOSS PER DAY IN %:	0.6265%	0.4837%	0.3479%	0.3215%	0.1643%

CALCULATED DIFFERENCE AGAINST THE LOSS OF L -1 in % AS 100 %

L -1	L -2	L -3	L -4	L -5
USED AS 100%	77.81% of L-1	55.11% of L-1	54.66% of L-1	22.92% of L-1

Table 8. Water vapor holding test on free styrene-butadiene latex paint films.

different origins did not affect the test results appreciably.

Another modifying factor was introduced in the test series, that is, the chemical modification of the mica mineral pigment by siliconization of the pigment particles. The siliconization, which was done in our laboratory, influences the water vapour permeability of the paint film considerably, whereby the water vapour losses dropped from the level observed on the initial test paint L-1 by 73.7%. Similar results were obtained with the siliconized form of 325-mesh mica with other latices, for instance, with Saran latex paints, where the losses with the treated pigment were 28.7% lower than with the untreated mica, and 31.2% lower than with a fibrous extender.

That the chemical surface modification of the mica pigment changes the relationship of the pigment to water can be shown experimentally. A study was made of the untreated and the treated platy mica by the addition of water (Figure 3). For this the C. W. Brabender Plastograph was used. This instrument measures the resistance encountered against the rotating instrument blades when water is being added to the test pigment at a constant rate and mixed with

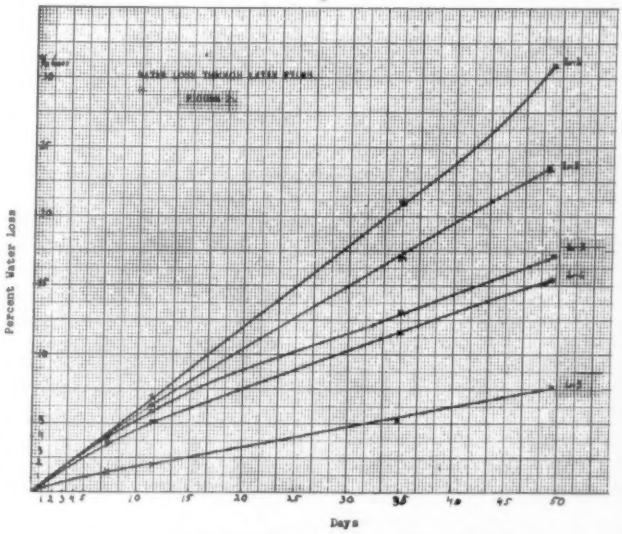

Figure 2. Water vapor loss through latex films.

the pigment. The resistance is measured in meter-kilogram of reaction torque by the dynamometer principle. The chart reads in linear units of consistency whereby each 100 units are equal to 0.1 meter-kilogram and are linearly related to other units of viscosity. Figure 3 shows that the modified pigment requires a considerably greater amount of water than the non modified pigment to reach a constant viscosity level. At this level the mixture offers a much higher resistance to the instrument mixing blades. More water can be added to the two mixtures until a diluting effect appears in the form of a dropping off of the resistance. Again, in the case of the surface modified pigment a considerably greater amount of water can be added before this dilution occurs. The two pigments, therefore, show a different relationship to water, and their different water vapour permeability might be influenced by such changed characteristics.

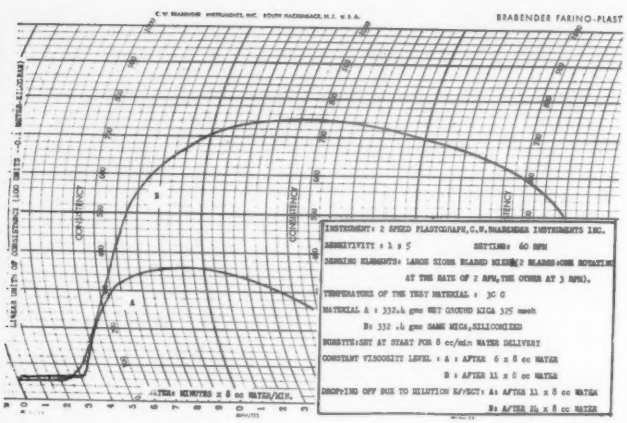

Figure 3

The effect of the chemical modification of the 325-mesh wet ground mica is not limited, however, to its application in water diluted paint systems. It can be observed, for instance, in the vinyl alkyd paints. Referring to Table 9, the same paint has been prepared once with untreated 325-mesh mica and again with surface modified mica. The water losses in milligrams and in percent are given in Table 10. They show about half the losses for the surface modified mica as for the unmodified pigmentation. Table 10 also shows that each of the four paints with any, or two, of the extenders used in this study has a considerably denser film, or a considerably lower water vapour loss than the paint without any extender, when all paints have the same total pigment weight in each of the test paints. Here again the lowest water loss was obtained with the paint having the greatest extent of combined pigment shapes and sizes, that is, Paint G-5 with the small particle sized titanium dioxide, the acicular zinc oxide, the fibrous magnesium silicate and the platy 325-mesh mica.

MATERIALS	PAINT G-1	PAINT G-2	PAINT G-3	PAINT G-4	PAINT G-5
	g	g	g	g	g
TITANIUM DIOXIDE (RA-NC)	15	15	15	15	15
ZINC OXIDE (XX-601)	55	55	55	55	55
LAMP BLACK	0.6	0.6	0.6	0.6	0.6
MICA, WET GROUND, 325 mesh	40	-	-	-	20
MICA, 325 mesh, SURFACE MODIFIED	-	40	-	-	-
MAGNESIUM SILICATE, FIBROUS 3 X	-	-	40	-	20
ALKYD RESIN (LONG OIL, SOYBEAN) 70% N.V. (PLASKON 3175-3)	100	100	100	100	100
MINERAL SPIRITS	25	25	25	25	25

PAINTS WERE GIVEN ONE PASS IN THREE ROLLER MILL AND ALLOWED TO STAND 18 HOURS.

LET DOWN:

TO EACH PAINT WERE ADDED:

VINYL SOLUTION, CONSISTING OF:	METHYL ISOBUTYL KETONE	200 grams
	XYLOL	20 grams
	VINYL RESIN (VAGH)	37.5 grams
NAPHTHENATE DRIERS:	LEAD 24%	0.1 gram
	COBALT 6%	0.1 gram
	MANGANESE 6%	0.1 gram

Table 9. Formulation of vinyl alkyd test paints.

Water Vapour Permeability vs Saltfog Exposure Tests

It was of interest to compare to what extent the water vapour permeability of the test paints might influence their saltfog exposure results. In case where the water vapour permeability of the free test films varied widely between two paints, there was agreement with saltfog exposure results of the applied test paints. But the tests made on some of the vinyl alkyd paints of Table 9 indicate that there are other factors also which influence the results of such widely different test methods. Figure 4 shows a photoplate of the 1000 hour saltfog exposure results of S.A.E. 1010 steel panels which had been coated with three coats of Paint G-3 (with fibrous magnesium silicate) and with Paint G-5 (with the mixed extenders, using magnesium silicate) and with Paint G-5 (with the mixed extenders, using magnesium silicate and 325-mesh mica in a one-to-one mixture). The saltfog resistance of Paint G-5, which had in the free film tests about 26% of the water vapour losses of Paint G-3, was considerably higher than Paint G-3. Figure 5 shows electrographic prints of the same two paint series. But in the case of Paints G-1 and G-3, where there was only a smaller difference in the water losses of the two paints (about 20%), the saltfog exposure results for the two paints were quite different. Paint G-1 with the platy extender alone stood up even better than the paint with the mixed extender (G-5), although in the moisture permeability tests the opposite was the case.

PAINT: EXTENDER:	G-1 325 mesh MICA	G-2 siliconized MICA	G-3 MAGNESIUM SILICATE	G-4 NO EXTENDER	G-5 MIXED EXTENDER
INITIAL WATER WEIGHT:	10.0601 g	10.0229 g	10.4058 g	10.0188g	10.0202 g
LOSS AFTER DAYS:					
ONE DAY	0.1461 g	0.0728 g	0.1170 g	0.1862 g	0.0271 g
in %	1.45%	0.725%	1.12%	1.86%	0.27%
AFTER 4 DAYS	0.4903 g	0.2780 g	0.4035 g	0.6585 g	0.1622 g
	4.92%	2.785%	3.91%	6.66%	1.61%
AFTER 6 DAYS	0.6827 g	0.3795 g	0.5621 g	0.9057 g	-
	6.73%	3.78%	5.59%	9.04%	
AFTER 7 DAYS	-	-	-	-	0.2164 g
					2.16%
AFTER 8 DAYS	0.8597 g	0.4691	0.7041 g	1.1235 g	-
	8.54%	4.68%	6.77%	11.21%	
AFTER 11 DAYS	1.1982 g	0.6388 g	0.9709 g	1.5536 g	-
	11.91 %	6.37 %	9.33%	15.506%	
AFTER 12 DAYS	-	-	-	-	0.3668 g
					3.66%
AFTER 13 DAYS	1.4809 g	0.7796 g	1.2106 g	1.9920 g	-
	14.72%	7.77%	11.63%	19.88%	
AFTER 14 DAYS	-	-	-	-	0.4122 g
					4.11%
AFTER 15 DAYS	1.8045 g	0.9449 g	1.4760 g	2.4428 g	-
	17.93%	9.42%	14.18%	24.38%	
AFTER 17 DAYS	-	-	-	-	0.4772 g
					4.76%
AFTER 18 DAYS	-	-	-	-	0.5049 g
					5.42%
AFTER 20 DAYS	-	-	-	-	0.5518 g
					5.507%
AFTER 25 DAYS	-	-	-	-	0.6607 g
					6.59%
AFTER 27 DAYS	-	-	-	-	0.0940 g
					6.926 %
AVERAGE LOSS IN % PER DAY	1.195%	0.628%	0.945%	1.625%	0.256 %

Table 10. Water vapor losses through free films of vinyl alkyd paints.

The reason behind this fact is that in the thin films of the moisture permeability tests, a high concentration of 325-mesh platy mica particles might result in a random rather than parallel arrangement of the particles to the surface of the thin film which might decrease the film sealing properties. When several

(*Turn to page 96*)

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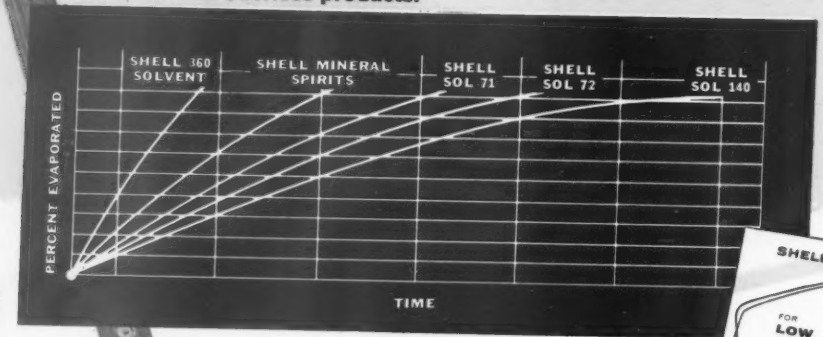

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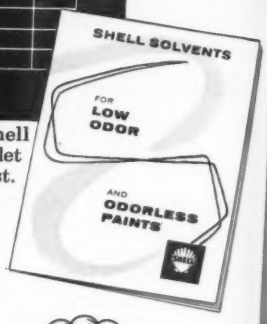

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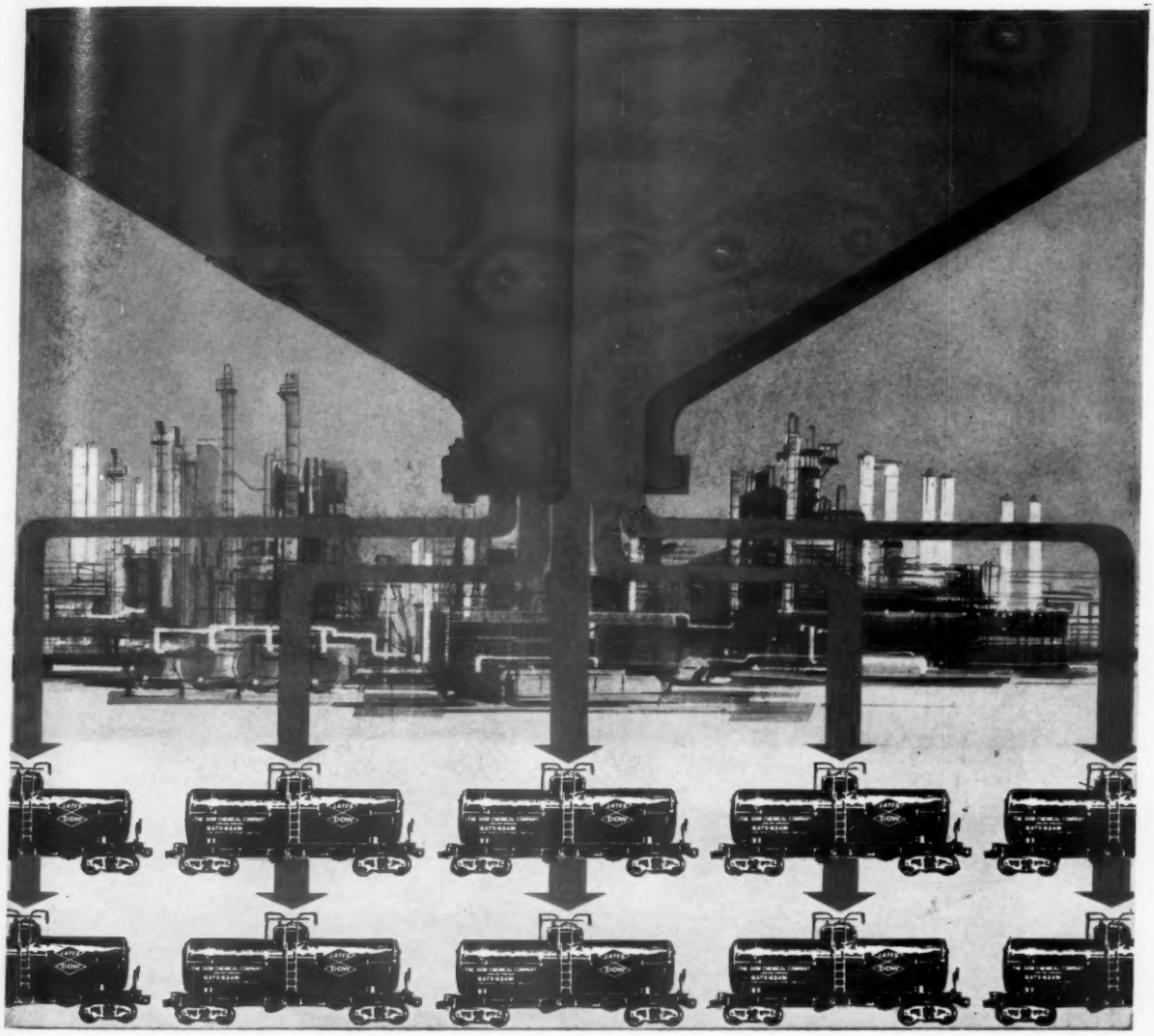

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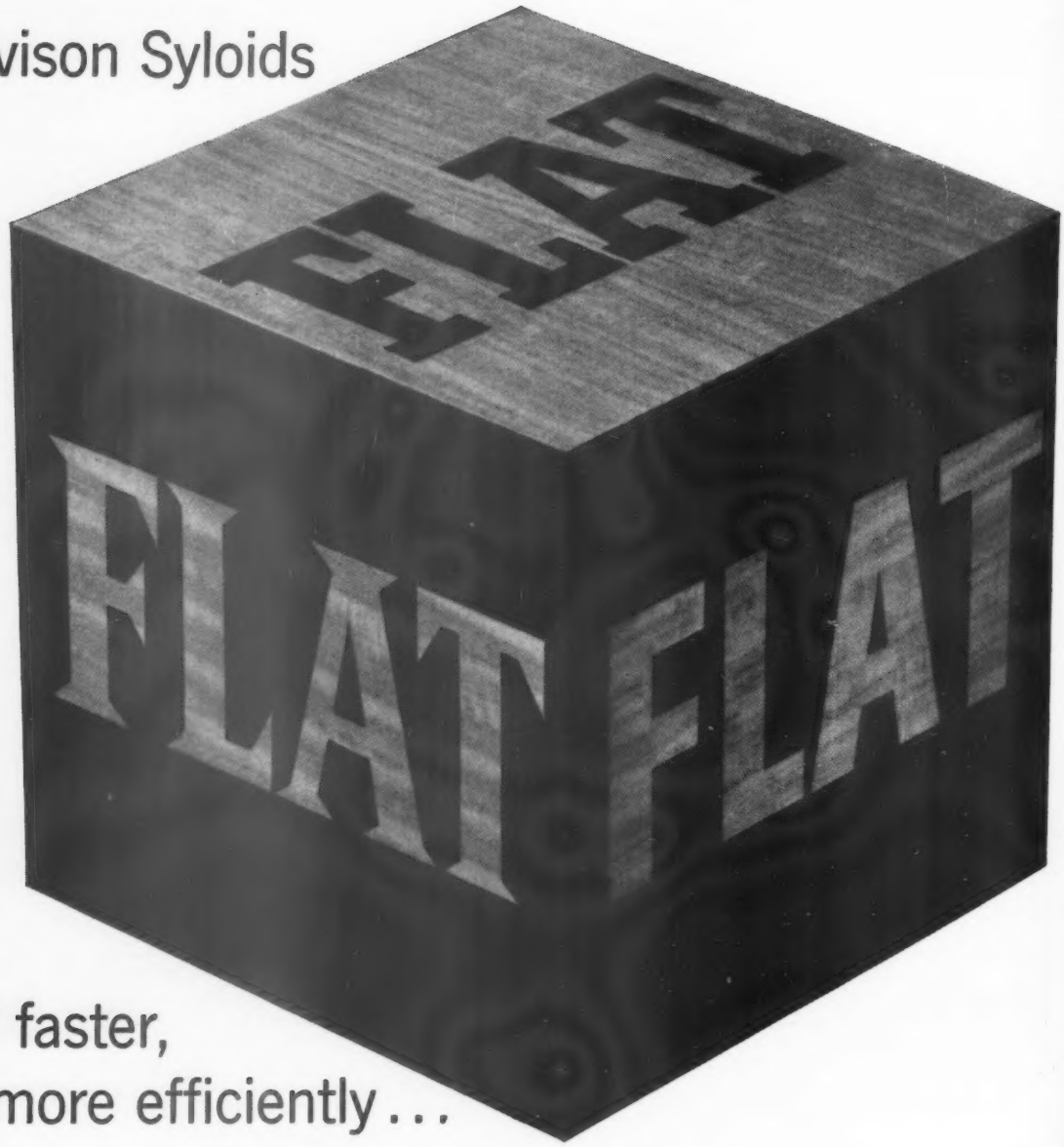

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DETERMINATION OF ROSIN in PROTECTIVE COATING VEHICLES

Part II

(*conclusion*)

By
Frank Spagnolo*

Experimental Details

Details of the preparation of the alkyd resins are given in Appendix C. Sufficient lead and cobalt naphthenates were added to samples used for analysis to give 0.50 per cent lead and 0.050 per cent cobalt, as metal based on vehicle solids.

Lead and cobalt tallates were added to a second sample of the rosin-free alkyd to give 0.64 per cent lead and 0.064 per cent cobalt based on non-volatile content. The 24 per cent lead tallate contained 12.2 per cent rosin acids and the 6 per cent cobalt tallate contained 15.6 per cent rosin acids. Therefore, the alkyd solution analyzed contained 0.50 per cent rosin acid based on non-volatile content.

Numerous variations in Spagnolo's proposed method were made to simplify or improve the procedure. The more important variables are discussed below.

To be assured of enough rosin acids to measure accurately, 20 to 40g portions of N.V.M. were saponified instead of the proposed 7g. Four hundred ml of diethylene glycol-phenetole-KOH reagent were used for all but one test (Table 1, Run 13).

Two portions of the 5.3 per cent rosin-acids-alkyd were saponified with 400 ml portions of 0.8 *N* KOH-diethylene glycol. One portion contained 32 ml of phenetole, the other contained 3 ml. The rosin acids were titrated in the presence of unsaponifiable matter. The values calculated for per cent rosin acids checked each other within 0.2 per cent, i.e., 5 parts in 100. Contrary to expectations, however, the end point was not easier to see in the presence of 3 ml of phenetole than it was in the presence of 30 ml. The reflux temperature, using 3 ml phenetole, was 190°C, which is thought to be too high for some samples.

Removal of unsaponifiable matter from the soap solutions did not improve the sample's color, nor did it affect the rosin acids value. Six analyses, which were made without removal of unsaponifiable matter (Table 1, Run Nos. 10, 12, 13, P, Q, and R), gave results favorably comparable with results obtained by other analyses in which saponifiable matter was removed (Table 1, Run Nos. 19, 23, 21, M, N, and O). However, although it appears that this step could be omitted in the case of these simple alkyds, it was thought desirable to include the operation since it might be necessary with some other types of vehicles.

Removal of unsaponifiable matter added materially to the operating time because of emulsion formation. Some emulsions remained stable for several days. Most of the emulsions broke into three phases, the rosin acids being in the lower two. Therefore, the procedure was simplified when it was found that essentially quantitative removal of unsaponifiable matter could be effected by a single extraction with 150 ml of benzene instead of the proposed three extractions with smaller portions, thus reducing time required for this operation. For example, two saponified samples were extracted, each with a single 150 ml portion of benzene. The extracts were evaporated free of benzene. The volumes of unsaponifiable matter remaining were 30 and 32 ml which is essentially complete recovery of the unsaponifiable fraction which was primarily the phenetole in the reagent.

Serious emulsion problems were not encountered

*National Lead Co., Research Laboratories, Brooklyn 1, N. Y., Chairman A.S.T.M. Group 7 on Rosin Content, Subcommittee IX, Committee D1.

Sample Number	Run Number	Source of Rosin Acids	Present	Rosin Acids in Alkyd N.V.M., Per cent Found, Calculated by: Herrlinger-Compeau (a)	Modified Herrlinger-Compeau (h)	Spagnolo (b)	Comments	Indicator
9905-2	E	None	None	0.04(e)	0.11(e)			Thymol Blue
	G	"	"	–0.01(e)	0.05(e)			Thymol Blue
	12	"	"	(–0.19) (f)	(0.04) (f)	0.53(f)	Unsap. (incl. ca. 30 ml. phenetole) not removed.	Phenol-phthalein
	21	"	"	(–0.17) (f)	(0.07) (f)	0.55(f)		Thymol Blue +pH Meter
9905-2-D	M	Tallate Driers(g)	0.50	0.11(e)	0.18(e)			Thymol Blue +pH Meter
	N	"	0.50	0.14(e)	0.21(e)			Thymol Blue +pH Meter
	O	"	0.50	0.21(e)	0.29(e)			Thymol Blue +pH Meter
	P	"	0.50	0.20(e)	0.27(e)		Unsap. (incl. ca. 30 ml. phenetole) not removed	Thymol Blue +pH Meter
9905-2-D	Q	Tallate Driers(g)	0.50	0.21(e)	0.29(e)		Unsap. (incl. ca. 30 ml. Phenetole) not removed	Thymol Blue +pH Meter
	R	"	0.50	0.20(e)	0.28(e)		Unsap. (incl. ca. 30 ml. Phenetole) not removed	Thymol Blue +pH Meter
9905-4	A	Acintol FA-2(c)	0.60	0.56(e)	0.68(e)			Thymol Blue
	B	"	0.60	0.72(e)	0.86(e)			"
	C	"	0.60	0.51+(e)	0.62+(e)		Known loss of 10-20 per cent of sample	"
	29	"	0.60	(0.68)	(0.81)	1.38(f)		Thymol Blue +pH Meter
9905-6	F	Unitol S(d)	5.3	4.6(e)	5.1(e)			Thymol Blue
	K	"	5.3	4.9(e)	5.4(e)			"
	L	"	5.3	4.8(e)	5.4(e)			"
	19	"	5.3	(4.4) (f)	(4.9) (f)	5.0(f)		Thymol Blue +pH Meter
9905-6	23	Unitol S(d)	5.3	(3.7) (f)	(4.1) (f)	4.3(f)		Thymol Blue +pH Meter
	10	"	5.3	(4.6) (f)	(5.2) (f)	5.2(f)	Unsap. (incl. ca. 30 ml. phenetole) not removed.	Phenolph-thalein
	13	"	5.3	(4.4) (f)	(5.0) (f)	5.0(f)	Unsap. (incl. ca. 30 ml. phenetole) not removed. 60 min. sapon. at 190°C.	Phenolph-thalein

(a) $1.031 \times \frac{V \times N \times 30.2}{\text{g. sample}} - 0.74 =$ True per cent R. A.

(b) $\frac{V \times N \times 30.2}{\text{g. sample}} =$ per cent R. A.

(c) Assayed by Herrlinger-Compeau Method, av. per cent R.A. = 0.97

(d) Assayed by Modified Wolff Method, av. per cent R.A. = 44.5

(e) Herrlinger-Compeau Method used on rosin-fatty acid product.

(f) Spagnolo Method used on rosin-fatty acid products.

(g) Assayed by Wolff Method, per cent R. A. in Pb drier = 12.3, per cent R. A. in Co drier = 15.3. Also assayed by method in Appendix B, per cent R.A. in Pb drier = 12.6 and 11.6, per cent R.A. in Co drier = 16.5 and 14.9.

(h) $\frac{1.14 \times V \times N \times 30.2}{\text{g. sample}} - 0.76 =$ True per cent R.A.

Table 1. Analytical data obtained on phthalic alkyds of known rosin-acids content using modifications of the Spagnola method.

elsewhere in the procedure. To acidify the soaps, sulfuric acid was substituted for hydrochloric acid. The resulting solid phase, lead sulfate, seemed to hasten layer separation in subsequent extractions.

For the extraction of rosin and fatty acids from the acidified soaps, benzene was used instead of ether because of its more favorable distribution coefficient with aqueous phthalic acid. The International Critical Tables show that, for a system similar to the one involved here, benzene would extract about a tenth or less as much phthalic acid as ether would. Benzene's property of forming an azeotrope with water eliminated an oven-drying step later in the procedure. The possible catalytic effects of ether's peroxides were, coincidentally, avoided.

The possibility of using dense chlorinated solvents was considered with the notion that extracts could be drawn off from under the aqueous phase, thus avoiding repeatedly transferring this phase. However, the density of the extracts was found to be too close to that of the aqueous phase to allow rapid separation.

Boiling stones were substituted for the proposed N_2 bubbler in the solvent removal step prior to esterification. The atmosphere of benzene vapor in the flasks seemed to protect the samples from oxygen.

For finally determining rosin acids in the rosin-fatty acid mixture, the Herrlinger-Compeau method was compared with the proposed method. The former was found to require less time. Table 1 shows that results obtained by the two methods are equivalent.

Slightly different constants, from those in the Herrlinger-Compeau equation, were computed from the experimental data obtained in this work. Rosin acid values calculated by using these constants, and by using the Herrlinger-Compeau constants, appear in Table 1. Although these new constants fit the present data, it would be necessary to confirm them with more synthetic sample data before recommending their general acceptance. It is therefore strongly recommended that in any future round-robin work that all data be recorded and reported along with the results obtained on the samples. This will permit calculation and evaluation of constants. Also, as a matter of convenience, all co-operators should report rosin acid values calculated on the basis of the original Herrlinger-Compeau equation.

For most of the titrations, 0.4 per cent neutralized aqueous thymol blue and 0.5 *N* methanolic KOH were used. Thymol blue was adopted after indistinct end points were obtained for three of the samples (reddish-brown solutions) which were titrated, using the proposed phenol-phthalein. The thymol blue changed sharply upon the addition of 0.05 ml of KOH at the end point. Several of the titrations, using thymol blue, were followed electrometrically. The instrumental and the colorimetric end points coincided at an apparent pH of about 10.5.

Appendix A

Initial Spagnolo Method of Test for Determining Rosin Acids Content of Varnishes and Alkyd Resin Solutions*

ASTM Committee D-1, Subcommittee IX, Group 7, March, 1954

SCOPE

1. This method covers a procedure for determining the total rosin acids content of varnishes. Total rosin acids determined include rosin from free rosin, esterified rosin, and rosin salts. Driers, if present, do not interfere with the determination.

PRINCIPLE OF METHOD

2. (a) The sample is saponified with diethylene glycol-KOH-phenetole reagent, by a modification of the method of W. E. Schaeffer and W. J. Balling, Anal. Chem. *23*, 1126 (1951). After extracting the unsaponifiable matter with benzene, the sample is acidified with HCl; the organic acids fraction is extracted with ether, and the ether removed by evaporation.

(b) The residue containing rosin, fatty, and possibly dibasic acids, is treated with methanol-H_2SO_4 reagent. In this step the fatty and dibasic acids are selectively esterified, while the rosin acids are not affected. The mixture of free rosin and methyl esters is then isolated by extraction with ether, after dilution with aqueous Na_2SO_4. The preferential esterification and isolation of the acids fraction are based on a modification of the method of R. Herrlinger and G. M. Compeau, J.A.O.C.S. *29*, 342 (1952).

(c) The rosin acids in the ether extract (after evaporation of the ether) may then be determined by three methods.

(1) Method A - Alkalimetric titration, similar to ASTM Method D-1240-52T.
(2) Method B - Potentiometric titration, as in ASTM Method D-803-51.
(3) Method C - Colorimetric Analysis, method of M. H. Swann, Anal. Chem. *23*, 885 (1951).

APPARATUS

3. The apparatus shall consist of the following;
(a) Stoppered weighing bottles, fitted with pipette and rubber bulb, 15- or 30-ml capacity. Fischer Scientific Catalogue No. 3-337 or similar apparatus is satisfactory.
(b) Erlenmeyer Flask—300-ml 24/40 S/T flasks of alkali-resistant glass, for saponifying the sample.
(c) Erlenmeyer Flask—200-ml 24/40 S/T.
(d) Condenser—30-inch 24/40 S/T air-cooled condenser.
(e) Condenser—water-cooled 24/40 S/T, approximately 15-inch length.
(f) Porous Boiling Stones.
(g) Electric Hot Plate.
(h) Separatory Funnels—three 500-ml and three 250-ml 24/40 S/T funnels.
(i) Nitrogen Gas Cylinder.
(j) Steam Bath.
(k) Vacuum Oven.
(l) Beaker—250-ml capacity.
(m) pH Meter—for potentiometric titration, fitted with alkali-resistant glass electrode and stirring assembly as specified in Method D-803-51, Section 22 (a).
(n) Burettes—10- and 25-ml automatic-type burettes fitted with soda-lime or Ascarite guard tubes.
(o) Burettes—two 10-ml capacity burettes, regular type.
(p) Volumetric Flasks—various sizes up to 200-ml, glass-stoppered.
(q) Volumetric Pipettes—various sizes.

*See Appendix D for latest revised method.

(r) Fritted Glass Crucible—30-ml capacity, medium porosity.

REAGENTS

4.* (a) Diethylene Glycol-KOH-Phenetole Reagent—0.8 *N* containing about 2 ml of phenetole in 25 ml of reagent. Add 48 g of KOH to a bottle containing 800 ml of diethylene-glycol. Insert a ground-glass stopper which has been lubricated with diethylene glycol. Shake vigorously until solution is effected, usually 2.5-3 hours. Add 70 ml of phenetole (ethyl phenyl ether), and shake manually for a few minutes to form a homogeneous colorless solution. Store the reagent in an amber-colored bottle.

(b) Ethanol—USP or Reagent Grade.

(c) Benzene—Reagent Grade.

(d) Hydrochloric Acid—Reagent Grade concentrated acid.

(e) Methanol—Reagent Grade.

(f) Ethyl Ether—Reagent Grade.

(g) Sodium Sulfate Solution—10 per cent W/V aqueous solution of Reagent Grade Na_2SO_4 in distilled water.

(h) Sulfuric Acid—Reagent Grade concentrated acid.

(i) Phenolphthalein Indicator—1 per cent W/V solution in ethanol.

(j) Standard 0.1 *N* Alcoholic KOH Solution.

(k) Standard 0.25 *N* Alcoholic KOH Solution.

(l) Sulfuric Acid—18 *N* Aqueous Solution.

(m) Acetic Anhydride—Reagent Grade

(n) Purified Rosin Standard—prepared as follows:

Reflux 70 g of wood rosin with 50 ml of 98 per cent acetic acid for two hours. Filter while hot through filter paper. After standing 12 hours or longer in a closed container in the dark, agitation will cause crystals of abietic acid to separate from solution. Filter through paper in a Buchner funnel, and wash with 75 per cent ethanol (by volume) until the filtrate is colorless. Take to constant weight under high vacuum (oil pump). Store under vacuum in a dark place, and prepare the calibration curve, as described in Method C, as soon as possible.

PROCEDURE

5. *Saponification and Isolation of the Acid Fraction*

(a) Weigh accurately by difference to the nearest milligram into a 300-ml alkali-resistant Erlenmeyer flask, a sample of varnish or varnish solution containing 7.0 g (±0.3 g) non-volatile material. Add approximately 75 ml of the diethylene-glycol-KOH phenetole reagent and a small boiling stone. Swirl gently to mix; lubricate the ground glass joint with a few drops of diethylene glycol, and attach to the air-cooled condenser. Reflux gently on a hot plate for two hours. The reaction temperature will be about 175 C. Take care that the flask is not heated to a higher temperature than is necessary for gentle refluxing, otherwise analytical results may be discordant.

(b) At the end of the refluxing period allow a few drops of ethyl alcohol to fall into the reaction mixture to provide an ethanol vapor blanket. Raise the flask onto an asbestos or transite support; carefully add 10 ml of ethyl alcohol; disconnect the flask stopper, and cool to room temperature under tap water.

(c) Transfer the contents of the flask quantitatively to a 500-ml separatory Funnel A, with the aid of a total of 250 ml of water. Add 50 ml of benzene, shake well, and allow the layers to separate. Draw off the lower aqueous layer into a second separatory Funnel B. Extract the solution in Funnel B with 25 ml of fresh benzene, and draw off the aqueous layer into a third separatory Funnel C. Run the benzene extract in Funnel B into Funnel A.

(d) Repeat the extraction of the aqueous layer with successive 25-ml portions of benzene until a colorless benzene extract is obtained, combining all benzene extracts in Funnel A. Finally extract the combined benzene extracts with three successive 15-ml portions of water, combining the water extracts with the main aqueous phase, and discarding the benzene extract (unsaponifiables).

(e) Acidify the aqueous phase by carefully adding 10 ml of concentrated HCl, and cool to room temperature under running tap water.

(f) Extract the aqueous layer with successive 25-ml portions of ethyl ether, using three separatory funnels as described in Sections (c) and (d) above and extracting until a colorless ether extract is obtained. Wash the combined ether extracts with successive 10-ml portions of water until the water extracts are free of hydrochloric acid.

(g) Transfer the washed ether extract to a 200-ml S/T Erlenmeyer flask, and evaporate the ether on a steam bath, using a gentle current of nitrogen gas from a glass capillary tube. Rinse the capillary tube with 1 or 2 ml of ether, evaporate the ether on the steam bath, and place the flask in a vacuum oven. Heat at 50 C for 1 hour under vacuum to remove moisture.

Note: If dibasic acids are present, they may volatilize and condense on the upper part of the flask. This does not affect the rosin acid determination, however, since any dibasic acids remaining are subsequently esterified or removed.

6. *Esterification of Fatty and Dibasic Acids*

(a) Add 50 ml of methyl alcohol to the oven-dried residue from 5 (g) above. Carefully add 2.0 ml of concentrated H_2SO_4. Attach to a water-cooled condenser; reflux for 15 minutes, and cool to room temperature under tap water. Run a reagent blank

simultaneously from here on for use with Methods A and B.

(b) Pour into 100 ml of 10 per cent Na_2SO_4 solution in a 250-ml separatory Funnel A. Wash the flask with successive portions of a total of 50 ml of ether, adding the washes to Funnel A. Shake well, and allow the layers to separate. Draw off the lower aqueous layer into a second separatory Funnel B. Extract the solution in B with 25 ml of ether, and draw off the aqueous layer into a third separatory Funnel C. Run the ether extract in Funnel B into Funnel A.

(c) Repeat the extraction of the aqueous layer with another 25-ml portion of ether, and transfer the ether extract to Funnel A.

(d) Wash the combined ether extracts in A with successive 25-ml portions of water until the washes are neutral to methyl orange.

(e) Transfer the washed ether extracts to a 250-ml beaker with the aid of ether, and evaporate the ether on a steam bath under nitrogen.

7. *Determination of Rosin Acids*

Determine the rosin acids by any of the following methods.

Method A Alkalimetric Titration

(a) Dissolve the residue from 6 (e) in 50 ml of 95 per cent methanol. Add 0.5 ml of phenolphthalein indicator, and titrate to a pink end point with 0.1 or 0.25 *N* standard alcoholic KOH solution. Run a titration on the reagent blank from 6 (a) - (e).

Note: If the rosin acids content is 5 per cent or less (non-volatile basis) titrate with 0.1 *N* standard alcoholic KOH solution, from a 10-ml automatic-type burette. If the rosin acids content is more than 5 per cent, titrate with 0.25 *N* standard alcoholic KOH solution from a 25-ml automatic-type burette.

(b) Calculation and Report

(1) Calculate the per cent rosin acids in the sample as follows:

$$\text{per cent rosin acids} = \frac{(S-B) \times N \times 0.302 \times 100}{W}$$

where:

S = ml of alkali solution required for titration of the sample

B = ml of alkali solution required for titration of reagent blank

N = normality of the alkali solution

W = grams of sample taken for analysis

(2) Report the rosin acids content to one significant digit following the decimal point.

Note: The proposed Method B Potentiometric Titration and Method C Colorimetric Determination of Rosin have been omitted since they were not considered in the Battelle work.

Appendix B

Detailed Procedure for Revised Battelle Method

APPARATUS

1. The apparatus shall consist of the following:

(a) Weighing Bottle—of 100-ml capacity, fitted with pipette, stopper, and rubber bulb.

(b) Flask—round bottom, 1000 ml, standard taper, borosilicate glass.

(c) Flask—Erlenmeyer, 500 ml, standard taper, borosilicate glass.

(d) Condenser—water jacketed for ca 15 inches, standard taper to match 1000-ml flask (b).

(e) Condenser—not jacketed, 30 inches long, standard taper to match 500-ml flask (c).

(f) Separatory Funnels—Squibb's type, 750 or 1000 ml, one needed.

(g) Separatory Funnels—Squibb's type, 1000 ml, three needed.

(h) Burette—a 10-ml automatic type with provision for excluding CO_2.

(i) Heating Mantle—electric, to accomodate 1000-ml flask (b).

(j) Autotransformer—as accessory to mantle (i).

REAGENTS

2. The following reagents are required:

(a) Ethanol, USP or Formula 3A or Formula 30.

(b) Benzene, cp.

(c) Methanol, cp—anhydrous.

(d) Ethyl Ether, cp or USP.

(e) Sulfuric Acid, cp—assay 95 per cent.

(f) Sulfuric Acid—approximately 9 *N*, aqueous.

(g) Sodium Sulfate Solution—approximately 0.7 molar, aqueous.

(h) Potassium Hydroxide Solution—0.5 *N* in methanol. Standardize against potassium acid phthalate at the temperature of the reagent when used for samples. Protect from CO_2.

(i) Diethylene Glycol, Potassium Hydroxide, Phenetole Reagent—Dissolve 96 g of cp KOH (85 per cent assay or better) in 1600 ml of dry diethylene glycol without heating. Dissolve 140 ml of phenetole (ethyl phenyl ether) in the resulting solution. Protect from light.

(j) Thymol Blue Solution—Dissolve 0.1 g of thymol sulfonphthalein in 0.22 milliequivalents of a standard alkali solution and dilute to 25 ml with water.

(k) Methyl Orange Solution—0.1 per cent aqueous.

PROCEDURE

3. *Saponification and Isolation of the Acid Fraction*

(a) Weigh accurately by difference to the nearest decigram into a 1000-ml round-bottomed flask, a sample of varnish or varnish solution containing 20 to 40 g of non-volatile material. Add approximately 400 ml of the diethylene glycol-KOH-phenetole reagent and a small boiling stone. Swirl gently to mix; lubricate the ground glass joint with a few drops of diethylene glycol, and attach to the water-cooled condenser. Reflux gently in a heating mantle for 2 hours. The reaction temperature will be about 175 C. Take care that the flask is not heated to a higher temperature than is necessary for gently refluxing, otherwise

analytical results may be discordant.

(b) At the end of the refluxing period allow a few drops of ethyl alcohol to fall into the reaction mixture to provide an ethanol vapor blanket. Raise the flask onto an asbestos or transite support; carefully add 10 ml of ethyl alcohol; disconnect the flask, stopper and cool to room temperature under tap water.

(c) Transfer the contents of the flask quantitatively to a 1000-ml separatory Funnel A, with the aid of a total of 300 ml of water. Add 150 ml of benzene, shake well, and allow the layers to separate. Draw off the lower layer (s) into a second separatory funnel.

(d) Extract the benzene extract with three successive 15-ml portions of water, combining the water extracts with the main aqueous phase, and discarding the benzene extract (unsaponifiables).

(e) Acidify the aqueous phase by carefully adding 80 ml of 9 *N* H_2SO_4 and cool to room temperature under running tap water.

(f) Extract the aqueous layer with 3 successive 50-ml portions of benzene, using three 1000-ml separatory funnels. Wash the combined benzene extracts with successive 30-ml portions of water until the water extracts are neutral to methyl orange.

(g) Transfer the washed benzene extract to a 500-ml standard taper Erlenmeyer flask, and evaporate the benzene on an electric hot plate, using a boiling stone.

4. *Esterification of Non-Rosin Acids and Titration of Rosin Acids*

(a) Add 100 ml of methanol to the residue from 3(g). Twirl the flask to dissolve the oil and add another boiling stone. Add slowly 5 ml of concentrated sulfuric acid while swirling the flask vigorously and connect the flask to the 30-inch condenser. Heat the flask and reflux for 10 minutes. Cool the flask to room temperature with cold water.

(b) Add about 250 ml of the sodium sulfate solution to a 750- or 1000-ml separatory funnel. Pour the contents of the flask into the funnel and complete the quantitative transfer of the flask contents with 100 ml of ether. Shake the funnel mixture thoroughly. Allow to settle, draw off the salt layer and discard. Wash the contents of the funnel twice again with 250-ml portions of salt solution. The last salt washing should not react pink to methyl orange indicator.

(c) After removing the last wash, draw off the ether solution into a 500-ml Erlenmeyer flask. Add 20 ml of ethyl alcohol and 1 ml of the thymol blue indicator. Titrate to the appearance of a blue color, using the 0.5 *N* alcoholic KOH. If the solution is very dark, titrate electrometrically to an apparent pH of 10.5 using glass vs. calomel electrodes.

5. *Calculation and Report*

$$\text{ROSIN ACIDS, per cent,} = \frac{1.03 \times AN \times 30.2 - 0.74}{S}$$

where:

A = ml of KOH solution used for titration of sample

N = normality of KOH solution

S = weight in grams of non-volatile in sample

Report the result to two significant digits.

Appendix C

Preparation of Alkyd Resins

Three alkyds were prepared in 2500-g batches in 5000-ml flasks. All were cooked at 450 F to a Gardner Viscosity of about Z to Z-1 at 70 per cent N.V.M. Formulation details are given below:

1. No. 9905-2

Control (no rosin present)

650 g phthalic anhydride
345 g tech. PE (10 per cent excess)
1585 g alkali refined soybean oil
0.35 g PbO
2580 g
−80 g water of esterification
2500 g theoretical yield

2. No. 9905-4 (0.58 per cent rosin)

650 g phthalic anhydride
345 g tech. PE(equivalent to PA plus 10 per cent excess)
1503 g Acintol FA-2(1 per cent rosin) (1)
185 g 95 per cent glycerol (equivalent to fatty acids plus 10 per cent excess)
2683 g
−183 g water of esterification
2500 g theoretical yield

$$\frac{1503}{2500} \times 0.97 = 0.58 \text{ per cent rosin}$$

3. No. 9905-6 (5.3 per cent rosin)

650 g phthalic anhydride
380 g tech. PE (equivalent to PA plus Unitol plus 10 per cent excess)
300 g Unitol S(44.5 per cent rosin) (2)
1265 g alkali refined soybean oil
2595 g
−95 g water of esterification
2500 g theoretical yield

$$\frac{300}{2500} \times 44.5 = 5.3 \text{ per cent rosin}$$

(1) 0.87, 0.89, 1.13, av 0.97 by Herrlinger-Compeau Method

(2) 44.4, 44.3, 44.7, av. 44.5 by Wolff Method using 30 min reflux.

Appendix D

Tentative Method of Test for Total Rosin Acids Content of Coating Vehicles[1]

ASTM Designation: D 1469—58 T

Issued, 1957; Revised, 1958[2]

This Tentative Method has been approved by the sponsoring com-

1. Under the standardization procedure of the Society, this method is under the jurisdiction of the ASTM Committee D-1 on Paint, Varnish, Lacquer, and Related Products.

2. Revision accepted by the Society at the Annual Meeting, June, 1958.

mittee and accepted by the Society in accordance with established procedures, for use pending adoption as standard. Suggestions for revisions should be addressed to the Society at 1916 Race St., Philadelphia 3, Pa.

SCOPE AND APPLICATION[2a]

1. (a) This method covers a procedure for determining total rosin acids content of normal rosin esters, varnishes, and alkyd resins, unmodified by such materials as maleic or fumaric acid, or phenols. Total rosin acids determined include free rosin, esterified rosin, and metallic salts of rosin.

(b) This method is designed primarily for material containing 0.5 to 5 per cent of rosin on the nonvolatile basis.

SUMMARY OF METHOD

2. (a) The sample is saponified with potassium hydroxide-ethylene glycol reagent, and acidified with hydrochloric acid. Heat is applied to hydrolyze metallic driers. This is necessary, especially when metallic rosinates are present.

(b) The mixture described in Paragraph (a) is estracted with benzene. The rosin and fatty acids and unsaponifiables pass into the benzene layer. The aqueous layer will contain certain dibasic acids, polyhydric alcohols, and other water-soluble products of saponification.

(c) The benzene is removed by evaporation, and the rosin acids are determined by a selective esterification and titration method.

APPARATUS

3. (a) *Air Condenser*, 30-in., with a 24/40 standard-taper joint.

(b) *Beaker*, 400-ml capacity.

(c) *Buret*, automatic type, having a capacity of 25 ml, for the standard potassium hydroxide solution, fitted with soda-lime traps to protect against absorption of atmospheric CO_2.

(d) *Erlenmeyer Flasks*, having a capacity of 500 ml and 24/40 standard-taper necks.

(e) *Glass Electrode pH Meter*, conforming to the requirements of the Method for Determination of pH of Aqueous Solutions with the Glass Electrode (ASTM Designation: E 70).[3] Alternatively, a completely automatic-type titrator may be used.

(f) *Separatory Funnels*, three, having a capacity of 1 liter and 24/40 standard-taper stoppers and joints.

(g) *Steam Bath*, located in a fume hood for evaporation of volatile solvents.

(h) *Stirrer*.—A variable-speed stirrer with a glass stirring paddle, for use during the titration.

PURITY OF REAGENTS AND MATERIALS

4. (a) Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.[4] Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

(b) Unless otherwise indicated, references to water shall be understood to mean distilled water.

REAGENTS

5. (a) *Benzene.*

(b) *Ethyl Alcohol*, conforming to formula No. 30 or No. 3A of the U. S. Bureau of Internal Revenue.

(c) *Hydrochloric Acid (sp gr 1.19)*.—Concentrated hydrochloric acid (HCl).

(d) *Methanol (absolute)*.

(e) *Methyl Orange Indicator (1 g per liter)*.—Dissolve 0.1 g of methyl orange in 100 ml of water. Filter if necessary.

(f) *Potassium Hydroxide, Ethylene Glycol Solution (132 g per liter)*.—Dissolve 132 g of potassium hydroxide (KOH) pellets in ethylene glycol and dilute to 1 liter.

(g) *Potassium Hydroxide, Standard Methanol Solution (0.2 N)*.—Dissolve 13.3 g of KOH pellets in methanol and dilute to 1 liter with methanol. Standardize against potassium acid phthalate primary standard.

(h) *Sodium Sulfate Solution (100 g per liter)*.—Dissolve 100 g of Na_2SO_4 in water and dilute to 1 liter.

(i) *Sulfuric Acid (sp gr 1.84)*.—Concentrated sulfuric acid (H_2SO_4).

(j) *Thymol Blue Indicator Solution (4g per liter)*—Dissolve 0.1 g of thymol blue in 2.2 ml of sodium hydroxide solution (4 g NaOH per liter) and dilute to 25 ml with water.

PROCEDURE

6. (a) Transfer to a 500-ml Erlenmeyer flask an amount of sample containing approximately 40 ± 2 g of nonvolatile material. Weigh the sample used to the nearest 0.1 g. Add 150 ml of the ethylene glycol solution of KOH, and swirl to disperse the sample. Add a boiling stone, attach the air condenser, and reflux on a hot plate for 2 hr.

(b) At the end of the 2-hr refluxing period, remove the solution from the hot plate and cool to room temperature under tap water. Add 100 ml of water, and while cooling under tap water, add 40 ml of HCl. Place on the hot plate again, reflux for 5 min, and cool under tap water.

(c) Transfer the sample quantitatively to a 1-liter separatory funnel with the aid of a total of 150 ml of water, followed by two 30-ml rinses of benzene. Mix, allow the layers to separate, and draw off the lower aqueous layer into a second 1-liter separatory funnel. Extract the aqueous layer with two successive 60-ml portions of benzene, and drain the aqueous layer into a third 1-liter separatory

2a. This method is currently under investigation by ASTM Subcommittee IX, Group 7, with emphasis on method refinement, and testing of a wide variety of samples.

3. See p. 1513.

4. "Reagent Chemicals, American Chemical Society Specifications," Am. Chem. Soc., Washington, D. C. For suggestions on the testing of reagents not listed by the American Chemical Society, see "Reagent Chemicals and Standards," by Joseph Rosin, D. Van Nostrand Co., Inc., New York, N. Y., and the "United States Pharmacopoeia."

funnel. Combine the benzene extracts, and wash with three 30-ml portions of water.

(d) Transfer the washed benzene extract to a 400-ml beaker with the aid of a total of 25 ml of benzene. Add a boiling-stone, and evaporate the benzene on a steam bath.

(e) Transfer the residue to a 500-ml Erlenmeyer flask with the aid of a total of 100 ml of methanol, add a boiling stone, and swirl to dissolve the oil. Slowly add 5 ml of H_2SO_4 while cooling under tap water. Connect the flask to the condenser and reflux on the hot plate for 10 min. Cool to room temperature under tap water.

(f) Add about 250 ml of the Na_2SO_4 solution to a 1-liter separatory funnel. Pour the contents of the flask into the funnel, and complete the transfer with 100 ml of benzene. Shake thoroughly, allow to settle, and draw off the salt layer. Wash the benzene layer again with two successive 250-ml portions of the salt solution. The last wash should be neutral to methyl orange; otherwise continue the washing with 50-ml portions of Na_2SO_4 solution until neutrality is obtained.

(g) After removing the last wash, draw off the benzene layer into a 400-ml beaker, using a total of 75 ml of ethanol to complete the quantitative transfer.

(h) Complete the determination by the indicator method (Paragraph (i)) or by the potentiometric method (Paragraph (j)).

Indicator Method

(i) Add 1 ml of thymol blue indicator and titrate with the methanol solution of KOH (0.2 *N*) to the appearance of a blue or blue-green color.

Potentiometric Method

(j) Titrate with the methanol solution of KOH (0.2 *N*) to an apparent pH of 10.5.

CALCULATION

7. Calculate the percentage of rosin on the nonvolatile basis, expressed as abietic acid, as follows (Note):

$$\text{Total rosin acids, per cent} = \frac{A \times N \times 30.2}{S}$$

where:

A = milliliters of standard KOH solution used for titration of the sample,

N = normality of the standard KOH solution, and

S = grams of nonvolatile sample taken for analysis.

NOTE.—If it is desired to express the total rosin acids as "commercial rosin," use 35.0 instead of 30.2 as the factor in the calculation.

REPORT

8. Report the results to two significant figures, and specify whether total rosin acids are expressed as "abietic acid" or as "commercial rosin."

PRECISION

9. (a) *Repeatability.*—The average difference between duplicate runs, performed by the same analyst at the same time, should approximate 0.2 per cent. Two such values should be considered suspect if they differ by more than 0.5 per cent.

(b) *Reproducibility.*—The standard deviation of single determinations, performed by different analysts in different laboratories, was found to be 0.35 per cent. The average difference between two such results should be considered suspect if they differ by more than 1.2 per cent.

NOTE.—The estimate of precision is based on a small set of data in the 4 per cent rosin acid range. The estimate will be revised, if necessary, as soon as the present program of testing a wide variety of samples is completed.

Acknowledgement

The author wishes to express his sincere thanks to the following persons who so kindly cooperated in this research: M. G. Bestul—West Virginia Pulp & Paper Co., A. Z. Conner—Hercules Powder Co., C. C. Hartman—National Bureau of Standards, K. Holt—Archer-Daniels-Midland Co., W. A. Kirklin—Hercules Powder Co., I. E. Knapp—Southern Naval Stores, P. D. Patrick Jr.—West Virginia Pulp and Paper Co., C. Perkins—National Southern Products Co., A. Pollak—Pulp Chemicals Association, A. D. Sill—W. S. Merrell Co., W. J. Stewart—Nuodex Products Co., J. C. Weaver—Sherwin-Williams Co., M. W. Weiss—Interchemical Corp., R. Herrlinger—Arizona Chemicals, K. Earhart—Jones-Dabney Co. & M. H. Swann Aberdeen Proving Grounds.

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With Particular Attention to Rosin

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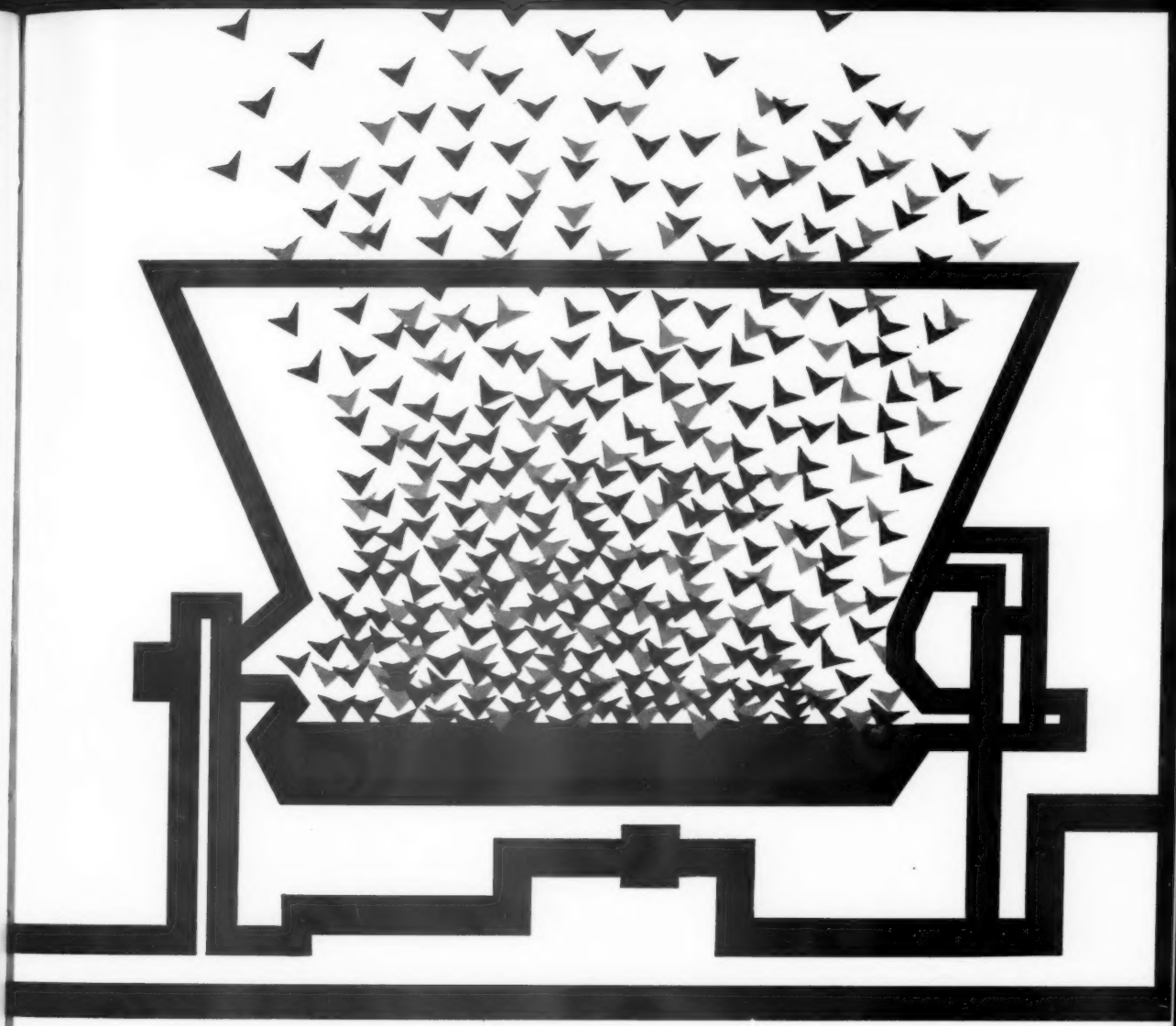

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Merry Christmas
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By
Phil Heiberger

The author continues his random reflections on various aspects of the paint industry. The opinions expressed in this column are his alone and do not necessarily reflect those of this publication.

Convention Afterthoughts

THIS column is being written while the memory of the Atlantic City Paint Convention is still fresh in my mind. I found this meeting exhilarating for a variety of reasons—the opportunity to keep abreast of new developments, the new ideas and product suggestions gleaned from viewing the paint show, the stimulation of the lectures and presentations, and, perhaps most of all, the opportunity to renew old friendships and establish new ones.


P. Heiberger

Too Much, Too Many

Despite the exhilaration, however, certain aspects of the convention disturbed me.

The fact that the tempo of the convention has accelerated beyond the norms of a few years back is a healthy sign, and, in a sense, a welcome one. It shows vitality and vigor. Yet, strangely, it is regrettable too, for many of those who attended the last convention, myself included, felt that there were simply too many meetings, too many lectures, too many exhibitions, and too many bull sessions packed too tightly into too few days.

I, for one, didn't screen the show intensively enough, didn't hear all the talks I wanted to hear, and didn't meet all the people I would have liked to chat with. I understand that to fit all the talks into the schedule, papers were unmercifully cut and symposia were interrupted in the middle of heated discussions. There were several instances of conflicting committee meetings.

Unsatisfactory Alternatives

What's the answer? Should the length of the convention be extended? This would surely disappoint those who, for one reason or another, couldn't spare more than a day or two.

The present practice of limiting papers and presentations has merit; however, it does seem patently unfair to the hardworking authors and committeemen who deserve recognition for their considerable contributions of time and effort. Moreover, it seems to disregard the needs of many individuals who attend these meetings expressly to increase their knowledge and further their technical skill.

Defining the Problem

There are two aspects to the problem. One refers to time, the other to interests. All busy people and growing, dynamic organizations feel hampered by time restrictions. They must battle them and circumvent them as much and as well as possible.

And all large organizations must tackle the task of satisfying the vastly different needs of a necessarily heterogeneous membership. An organization of paint technologists is no exception.

There seems little question that paint technologists comprise a heterogeneous group. The number of areas and the amount of information of indirect interest to group members are increasing rapidly year by year, just as the membership itself continues to increase. Naturally, the pieces of information members wish to exchange with one another increase in number too, and not every member has an equal interest in every item of information. In other words, specialization occurs.

Eventually the point is reached where convention officers, directors, program chairmen, and speakers find themselves in the predicament of having to choose among several alternatives, none of which is entirely satisfactory. Shall a talk be addressed to one specialized group? If so, which group? Or should an attempt be made to appeal to the average member?

The difficulty stems from the elusiveness of the mythical Mr. Average Man, be he a so-called "typical American," typical paint technologist, or typical member of any large group. However carefully a program is designed, however thoughtfully a talk prepared, there will always be a sizable percentage among the audience who will react with resentment, some because it's beyond their level of understanding, other because it's beneath it, and still others because it just has no interest for them. To complicate the matter even further, the same individual can run the gamut of reactions as he goes from one talk to another, depending upon the relation between the

various topics under discussion and the individual's unique pattern of background, experience, training, and immediate spheres of job interest.

In too many instances program chairmen are behooved quite understandably, to schedule talks, topics, and symposia in the form of compromises. Unfortunatley, a compromise designed to please everyone frequently falls far short of its goal.

One Solution

Many societies with a huge and diverse membership (the American Chemical Society is one such), have successfully adopted a convention policy that takes full advantage of the situation. Each talk is geared to the level dictated by the subject. A speaker need not worry about whether his audience will understand or appreciate his efforts; he prepares his paper for the approval of his peers. Titles and abstracts are prepared and distributed in advance. Members disinclined to attend any particular talk simply refrain from doing so, selecting instead, according to personal prefer ence, another event scheduled for the same hour.

This may be the key to a solution of the problem: simultaneous meetings, meetings geared to the interests and needs of specialized groups.

Many organizations use this technique of organization successfully and manage to schedule hundreds of papers in a few days time for the maximum benefit of the membership. Perhaps the Federation is now approaching the proportions that indicate it may be time to seriously consider following suit.

Membership Analysis

If the membership of the entire organization were classified according to interest groups, we'd find at least the following subdivisions, perhaps more: technical service and sales, physical testing and quality control, production, formulation, research, and purchasing and administration. Each group has both interests unique to itself and interests in common with other groups.

Rather than try to make each presentation appealing to every member of every group every time, maybe it would be wise to eschew this approach for the most part. Why assume, for example, that quality control supervisors will have a keen interest in production scheduling, research workers in color preferences, and purchasing agents in a study on the mechanisms of film formation? On the other hand, why bar a paper because its appeal would necessarily be limited to a small group?

It would seem logical to schedule simultaneous sessions, each session geared as much as possible for specialized appeal for mutually exclusive groups (some larger, some smaller), each geared also to the maximum sophistication of its specialized audience.

Naturally, two research papers would not be scheduled for the same hour, but a paper on producing color matching might easily be given at the same time as another on adhesion fundamentals without fear of serious conflict. Where overlapping interests cause distress, one of the papers can be read with care when published.

Recorders Report

I have heard that it is common practice at recreation and education conferences to follow a plan such as this: The conference (or convention) opens with a general meeting appealing to all members. After words of greeting, introductory remarks, and speeches of general interest, the crowd disperses, according to individual preferences, into a series of several simultaneous small meetings, each devoted to a previously announced specific topic. This insures high interest of participants and manageable discussions enriched by generous give-and-take.

Experience has shown that groups composed of between 15 and 25 people tend to function best. This size usually permits representation of enough different viewpoints to make a discussion stimulating and fruitful, but tends to prevent operation of factors that inhibit active participation of all, such as shyness before a large crowd and shortage of time.

An important part of a plan of this type involves the appointment of a recorder in each small meeting. At the end of the conference or convention, a closing general meeting is held at which each recorder reports to the entire membership with a concise statement of the sense of the meeting for which he was responsible. Later on, each recorder's minutes are mimeographed or printed and mailed to all who attended the convention.

Dr. Gordon's Philosophy

In an editorial in the October 5, 1959 issue of CHEMICAL AND ENGINEERING NEWS, Editor Walter J. Murphy reviewed the philosophy behind the Gordon Conferences in developing his theme, "Small, Intimate Scientific Conferences."

Stated Dr. Murphy, "Dr. Gordon deplored meetings en masse as often preventing, rather than promoting, fruitful contacts between creative minds. Furthermore, he felt that some meetings, by their very size, were attracting people who lacked deep insight and true interest. These 'outsiders,' as Gordon categorized them, not only failed to participate in and contribute to worthwhile discussions, but their very presence interfered with those who would or could."

In today's world of mass communication, everything that blocks free flow of communication should be sytematically eradicated or modified. My main purpose for starting this discussion is to help pave the way for even more stimulating lectures and more fruitful discussions in an even wider range of activities. Do you feel this way?

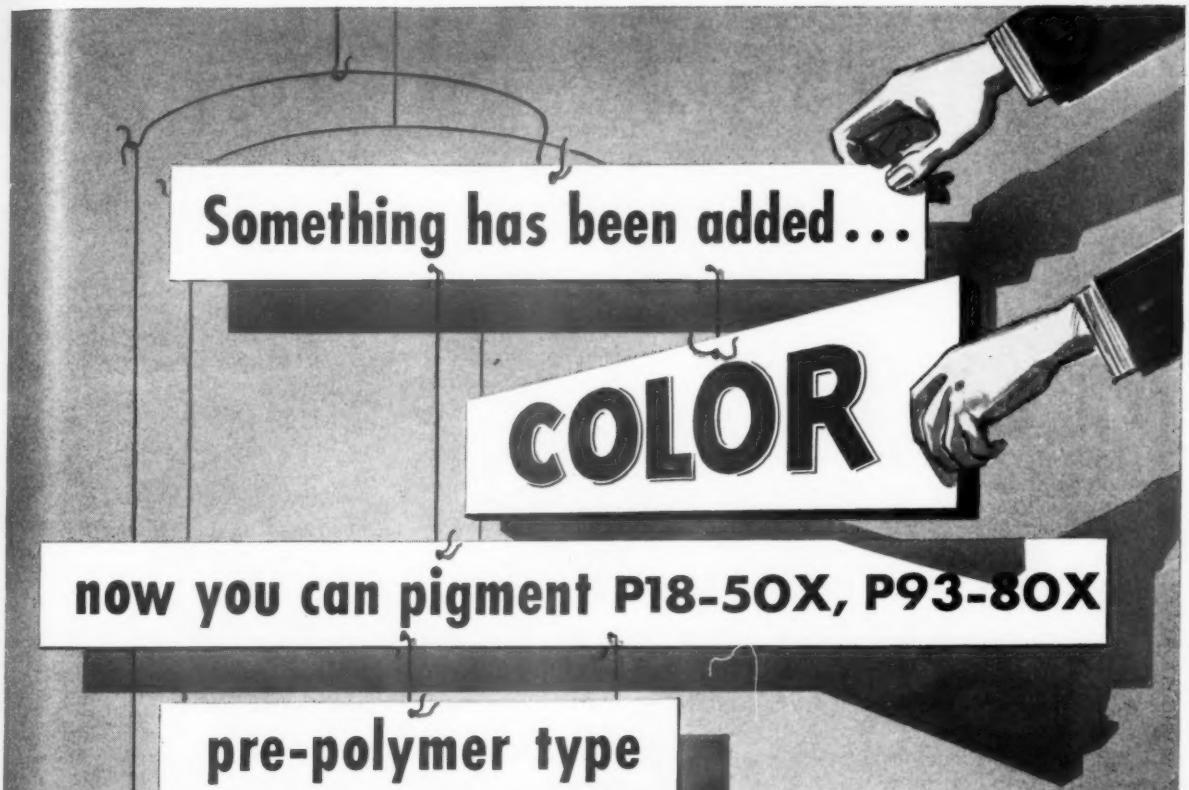
•

Simcox Elected President

C. G. Simcox, Assumption, Ill., was elected president of the American Soybean Association during its 39th annual convention here Aug. 12. He stepped up from vice president and succeeded John Sawyer, London, Ohio, who has served as president the past 2 years.

Charles V. Simpson, Waterville, Minn., was elected vice president, succeeding Simcox. Geo. M. Strayer, Hudson, Iowa, was re-elected executive vice president and secretary-treasurer.

New directors elected were Hubert Baker, Dalton City, Ill., succeeding Albert Dimond, Lovington, Ill.; W. M. Wallace, Woodslee, Ontario, Canada, succeeding A. E. Jolley, Chatham, Ontario; Glen Myers, Memphis, Mo.; and Harry Gatton, Jr., Rumsey, Ky.



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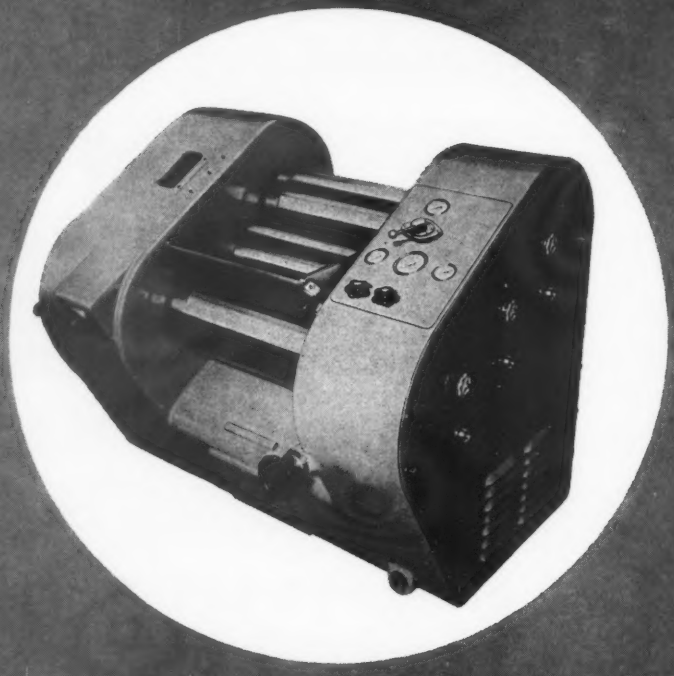

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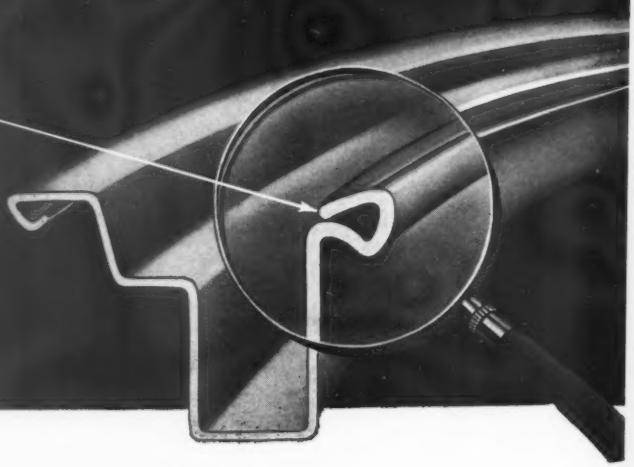

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A FORMS CONTROL PROCEDURE

By
Lawrence Shatkin

Elliot Paul once stated, "Government forms which had been printed in such a way that there was never enough space in which to provide answers to ambiguous questions," is further intensified by the tendency of paper forms to run wild in industry and government. Efforts to combat this accumulation of unnecessary forms invariably meets resistance. However, it represents a fertile area for cost reduction, which has been badly neglected except by a few progressive organizations.

Objectives

The objectives to be sought and the advantages to be obtained through a "Forms Control" system are:

1. Easy access to forms because of noted locations;
2. A clearer picture of useage of forms through recorded information;
3. Better control of forms through consolidation, classification, and systematization;
4. Possible savings through better methods and procedures;
5. The propensity to impart better service and improved relations.

Forms Control Procedure

1. All forms will be assigned an identification code at the bottom on left side of form in the following manner:

   A) A letter will be assigned to each form indicating its place of origin:
   "O" for Office (including credits)
   "S" for Sales (including advertising)
   "P" for Production (including laboratory)

   B) These letters will be followed by three numbers identifying the department: #101 to 399—"O"
   #401 to 499—"S"
   #701 to 799—"P"
   These forms will be increased numerically so that each form has been identified with a number.

   C) A letter follows the number indicating the revision, if any, the form has undergone. For example, O-101A would be an office form, number one, first version. O-101B would signify an office form, number one, second rendition.

2. Each form will be inserted in a manila folder imprinted with the Forms Control Log. The various forms will be located in areas where they are most frequently used.
3. When a request for revision or renewal of an existing form is made, the control log should be checked to see:

   A) Whether any recommendations or suggestions have been received for changes in the form;

   B) Whether any changes are pending in procedure, program, or organization which might affect the form;

   C) If revisions are required, appropriate steps should be taken before the order is placed.

   During the interim, any ideas pertaining to forms should be attached to the current form in the control log.
4. Before reordering, current forms plus recommendations, if any, should be passed to the respective persons in the departments concerned, or, to any other individual actually using the form to pick up ideas for improvement.
5. When reprinted forms are delivered, any revised form should be inserted into control log on top of obsoleted form.
6. The minimum stock level (reorder point) should be established and so marked in stock room for easy visibility. Red markers will be made available for this purpose.
7. Stocking and distributing of forms are determined and noted in form control log. Except for current working requirements, the supply of forms should be stocked at central locations where they are easily obtained.
8. Inventory and rate-of-use information should provide the basis for establishing a minimum stock level, distribution pattern, and reorder procedure so that production costs are minimized by ordering in economical quantities.
9. An annual review of all forms should be made by the department head or his designee for the

The opinions expressed in this feature are not necessarily those of any particular firm or organization.

FORMS CONTROL LOG

F. C. No.	LOCATION	INVENTORY		ORDER					REORDER POINT	REMARKS
		DATE	QUANTITY	DATE	QUANTITY	PRINTER	DATE RECEIVED	UNIT PRICE		

Figure 1.

DATE	REMARKS	RECOMMENDATIONS FOR MODIFICATION	DISPOSITION

Figure 2.

purpose of consolidating forms wherever possible, and eliminating all obsolete, duplicate, and unnecessary forms. Put every form on trial for its life at least once every five years. Don't clutter operations with unnecessary or long winded forms.

Top-Management Participation

No matter how well conceived the forms-control plan may be in other respects, the plan will not become an actuality unless top-management gives its support. Top management will have to fix responsibility for participation in the program. It will be necessary to formulate and issue a policy directive which will specify the scope of the program in relation to the corporate structure.

The Forms Control Log

This is a chronological record of incoming and outgoing forms, their assignment for analysis, and the action taken on them. The log serves as a basis for compiling the necessary information to show the status of any form under consideration. A simple design is shown in Figures 1 and 2.

Before incorporating a form in the Forms Control Log, the following questions should be asked:

1. Is this form necessary?
2. Could any existing form serve the same purpose?
3. Could the form be consolidated with some other form to impart a multi-functional useage?
4. Does the form help to get the job done promptly, at a minimum cost?

Eliminating Obsolete Forms

Not only should the work of eliminating or combining some active forms make others obsolete and subject to disposal, but a review of the control log should provide a fertile source of information on slow-moving, obsolete, or inactive forms.

It is advisable that the different departments regularly submit information concerning forms which they have discontinued, so that prompt action may be taken to deplete its stock.

This process of review and comparison, thus, should not only reduce the number of forms by logical consolidations but should quickly identify those which lapse into disuse as a result of program or operating changes.

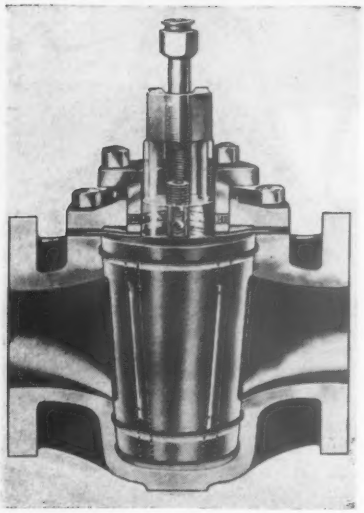
The objectives and operations of a forms control program are predicated upon simple, sound principles of modern management. Three ends are sought: centralized control of all forms, uniform standards of design, reproduction, utilization and housing, and the elimination of all obsolete, duplicate, and unnecessary forms.

•

New Distributor

The appointment of Missouri Solvents and Chemicals Company as distributors of Hercules Powder Company's Synthetics Department resins in two midwestern areas, effective September, 1was announced.

The new distributors will cover metropolitan St. Louis, southern and central Illinois, metropolitan Kansas City, and the state of Kansas, as well as portions of Arkansas, Iowa, Nebraska, and Oklahoma.



Cross section of lubricated plug valve.

LUBRICATED PLUG VALVES SOLVE LEAKAGE PROBLEM

Socony Paint Co. finds this type of valve provides positive shut-off, especially for solvents, hot vehicles.

SOCONY Paint Products Company, Metuchen, New Jersey, solved the problem of leakage by the installation of lubricated plug valves on numerous lines transporting oils, solvents, liquid resins and varnishes. This class of valve provides positive shut-off because of a lubricant film seal between the plug and valve body. Socony found the pressurized lubricants especially effective in preventing leakage of thin process fluids such as solvents or hot liquid resins.

Lubricated plug valve used on lines leading from liquid resin tanks at Socony Paint Products, Metuchen, New Jersey plant.

Workman operates three-way lubricated plug valves controlling flow of solvents from the tank farm.

Two-inch, semi-steel valves are easily operable, opening or closing completely with a quarter turn.

Another advantage of the lubricant is as a "jacking agent." No matter how long the valve remains closed, the plug unseats easily.

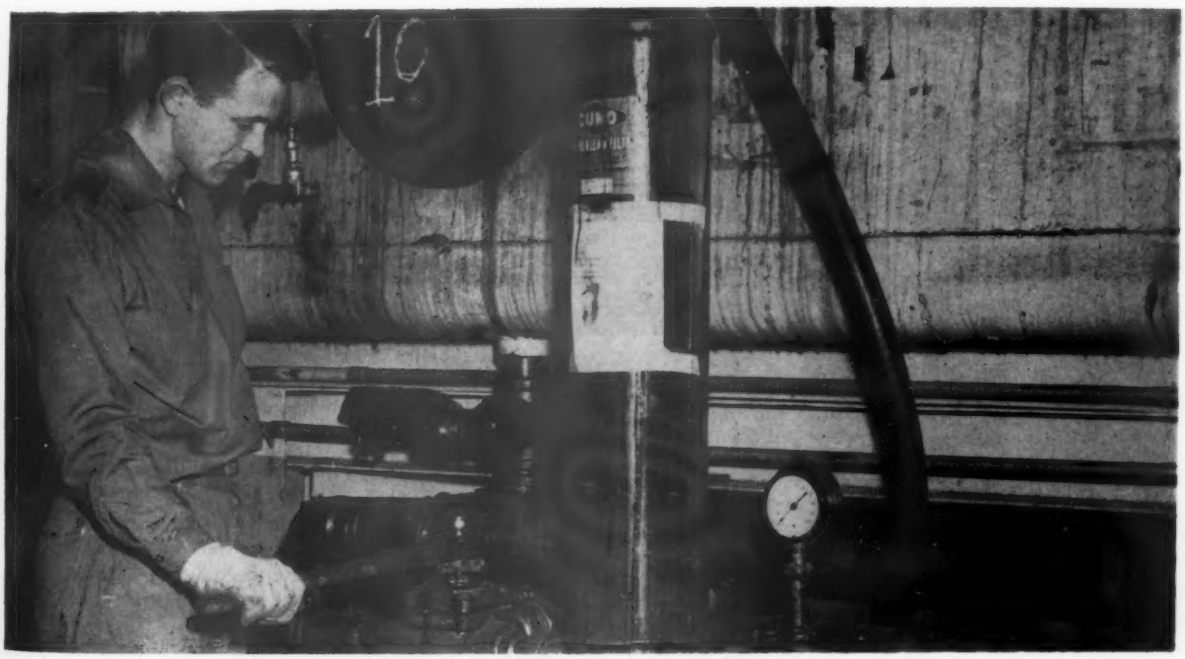
Other Advantages

The plug valves, a product of Rockwell Manufacturing Company's Nordstrom Valve Division, also offer other design advantages. The plug works by rotation only, avoiding the raising and lowering of a moveable valve member. Thus paint skins or other foreign particles cannot interfere with proper seating or valve action.

In the closed position the plug opening is at right angles to the direction of flow, eliminating the danger of (undetermined) see page through the line.

Plug Valves Easily Adaptable

Plug valves were also selected by Socony because of their adaptability. For dual distribution, each three-way plug valve replaces two other valves. For more complicated selection and distribution, Rockwell-Nordstrom plug valves were integrated into manifolds. This eliminated butt ends and the consequent danger of contamination. The compact construction of these valves, with no projecting bonnets or yokes, enhances their adaptability to manifolding and has enabled Socony to install such manifolds in limited space areas. An added advantage is quick action—the valve opens or closes completely with a quarter turn.



Three-way lubricated plug valves on line to filter. Material that does not need such fine filtering is directed to bypass line. Plug valves offer same positive shut off for thinners as it does for slurries and dispersions.

WEATHER-RESISTANT BUTYRATE LACQUERS PRESERVE THE NATURAL BEAUTY OF ALUMINUM

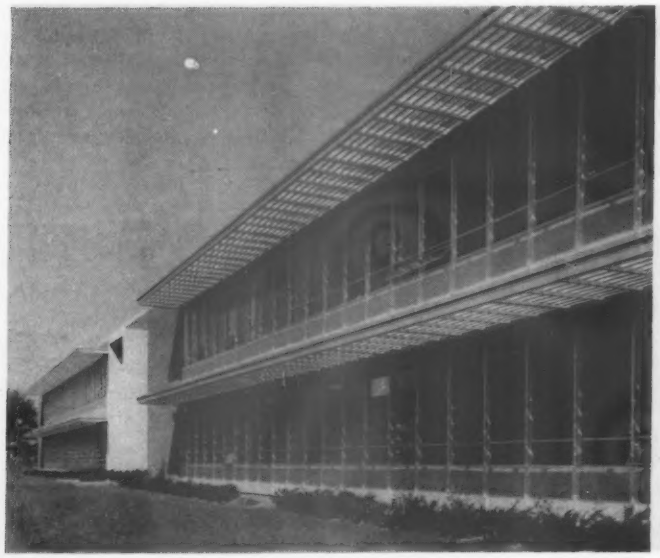
Here's welcome news for architects and engineers.

Clear, colorless Butyrate lacquer—a new type of coating—provides lasting weather protection for aluminum.

Butyrate lacquers form tough, tenacious coatings that won't turn yellow, even under prolonged exposure to sunlight. They withstand oxidation and discoloring...have excellent flexibility and strength...and are little affected by salt spray, water immersion or temperature change.

Cleaning and maintenance costs are reduced to a minimum, too, when outdoor aluminum products are coated with Butyrate lacquers. Apart from an occasional hosing in areas of extreme contamination, rain alone will keep the aluminum surface gleaming.

This combination of features makes Butyrate lacquers particularly advantageous for use on aluminum curtain walls, siding, spandrels, louvers, solar canopies and architectural trim and hardware.



With the increasing use of aluminum products outdoors, the market for Butyrate protective coatings is growing rapidly. Take advantage of this opportunity for new business by offering lacquers made from Eastman Half-Second Butyrate.

An informative 15-minute, 16mm. sound color film has been produced especially for viewing by those interested in this market.

North Central High School, Indianapolis, controls sunlight and reduces summertime heat transmission with aluminum sun cornices made by O. O. McKinley Co., Inc., of Indianapolis, Indiana. The satin finish of the aluminum surface is protected from weathering by a clear, colorless Butyrate lacquer.

The finest lacquers for aluminum are made with

HALF SECOND BUTYRATE
on Eastman film former

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; Atlanta; Chicago; Cincinnati; Cleveland; Detroit; Framingham, Mass.; Greensboro, N. C.; Houston; New York City; Philadelphia; St. Louis. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

LACQUER FORMULATORS!

Get the complete story on this new type of protective coating for outdoor aluminum.

(1) Send for Eastman's catalog on Butyrate lacquer. It tells you where this new lacquer has proved particularly successful and why it is so effective in preserving aluminum surfaces.

(2) Send for 16mm. sound color film. Please indicate the date you plan to show the film and an alternate date.

Aerosols in the Paint and Varnish Industry

By
L. M. Garton*

THE VOLUME of pressurized products in the paint and varnish field has increased steadily over the past few years, and has reached proportions significant to the industry. On this basis, it seems desirable to discuss some of the various phases and aspects of the aerosol industry, particularly as it relates to paints, varnishes and lacquers.

The aerosol principle in a self-dispensing package was introduced to the consuming public shortly after World War II in the form of war-surplus "bug bomb" insecticides. These insecticide products were based on the work of Goodhue and Sullivan, and patents were granted on the principle. The products were effective, and the "push-button" method of dispensing from a self-powered package was an immediate success with the public. This small beginning fostered the aerosol industry, which has expanded to about 600 million packages per year in the past fifteen years, and promises further rapid growth. These specialty products have become an important factor in the insecticide, cosmetic, paint, and food industries.

The aerosol system is complex, and comprised of several components; the success of the finished product depends upon the proper function of each component, and their function together as a whole.

Basic Components

The basic components of the pressurized paint package, including the valve, propellent, container, and product concentrate, make the finished package fairly expensive. In most aerosol paint products, the propellent constitutes a large proportion of the finished formulation, which reduces the actual paint product ratio to the overall size of the package. On this basis, the convenience of the package and product application, and the appearance and quality of the finished coating, must provide a definite advantage to the consumer in order to be acceptable.

The early entries of aerosol or pressurized paint products were in the form of clear protective coatings and metallized coatings, with colored or pigmented coatings following in direct sequence. The most obvious advantages of the pressurized package were quickly recognized by the consumer, and particularly the home "do-it-yourself" artist. The application is swift, even on rough or irregular surfaces, and the coating dries quickly to a smooth finish with no brush marks. There is no paint to stir (or spill), no brushes or cans to clean, and any paint left over does not dry out in the can.

However, there were some details which were, and are, overlooked. Spray painting requires a rather definite technique; ask the man who has tried for the first time to give his car a spray coat of lacquer for that "new look". Also, in spite of careful masking, not all of the paint dispensed lands on the desired target—some of it drifts in the air. After giving the living-room radiator a bright aluminum spray-finish, it is discouraging to find an aluminum-speckled finish on the mahogany furniture, not easily removed.

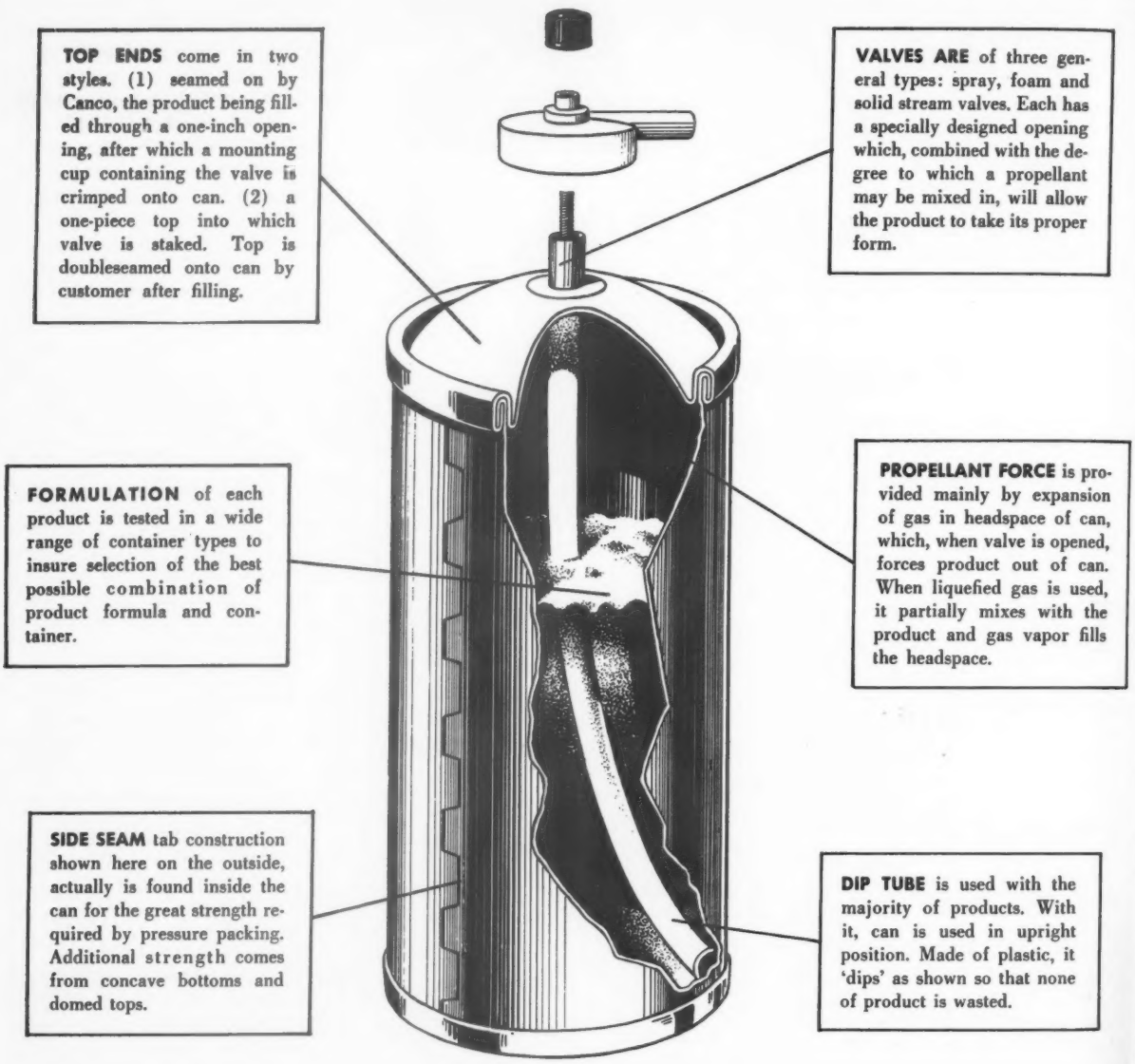
Problems

Some of the problems that harassed the pressurized paint producers and consumers in the beginning were partly due to the product and package components. There were successes, false starts, and failures; there were failures due to errors, honest mistakes, and combinations of problems never before encountered. Spray valves were costly and complex, and some produced an inferior spray pattern or were subject to clogging due to design. In some instances, product formulations that lost stability on aging, pigments that settled or agglomerated, and related problems were encountered. Spray particle size characteristics and spray patterns often left something to be desired. Some valves were designed to be used on more than one package, to distribute the cost. However, this re-use feature required thorough cleaning of the

Courtesy American Can Co.

Wide range of pressure containers in various styles and sizes. Newest can in field is seamless aluminum container.

*Non-Food Group, Eastern Laboratory, American Company.



Schematic Diagram of a Pressure Can

valve after each use to prevent clogging of the orifice by dried paint. This oft-neglected task was almost equivalent to cleaning a paint brush, and was not well accepted by the consumer. A clogged valve on a can of pressurized paint rendered the package useless, whether it was nearly empty or full, since there was no practical way for the consumer to get the product out of the container in usable form.

There were problems relating to formulation stability, pigments that did not disperse readily by "shake well before using" procedures, propellent problems, container problems, corrosion problems, all contributing to product deterioration and/or application difficulties.

Over the past few years of experience, there have been many improvements in pressurized paint products. Spray valves of simple but effective design have been developed; product formulations and procedures have improved; superior filling practices have been adopted; problems involving containers and container corrosion problems have been solved; and problems related to propellents have been eliminated. Some problems still exist, and new problems will arise, but much progress has been made.

The education of the consumer to the use of pressurized paint products has also advanced. Most users have learned to mix the paint thoroughly before using, and to invert the container and exhaust the valve and dip tube after each use, to clean the valve and empty the dip tube to prevent a "slug" of settled pigment from clogging the valve the next time the package is used. Fewer people bring a cold pressurized paint can in from the garage and try to use it before it has warmed to room temperature. The actual spraying technique has also

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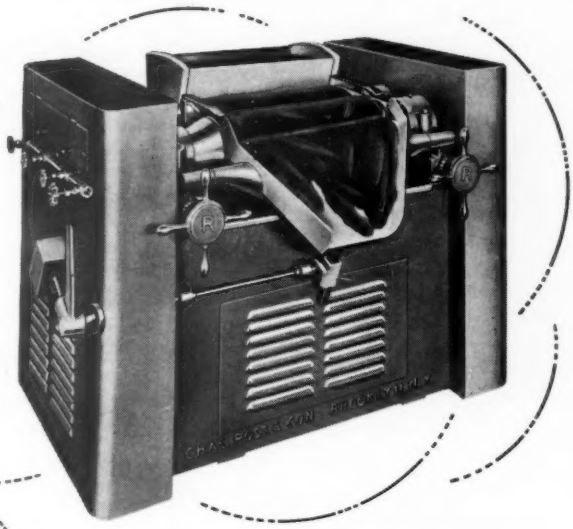

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Cannot affect the batch or equipment in any way.

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ACROLITE PRODUCTS, Inc.
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improved, with a valuable assist from superior products. In the consumer field there is still plenty of room for education and further knowledge, but here again, progress has been made.

Basic Types

At the present time, there are three basic types of pressurized paint or coating products available, (1) the nitrocellulose or acrylic lacquer base coatings, (2) varnish or drying oil base coatings, and (3) the more recent water-miscible products which provide a special vari-colored mottled or speckled finish. Aerosol coatings provide a definite and special addition to the field covered by the paint industry, and serve an important function in home and industry, in automobile and appliance touch-up, decorative uses, and "do-it-yourself" projects.

There are numerous possibilities for further development in the field of specialized coatings or finish effects for which the pressurized spray principle may be applicable. Wider distribution of present products and new product developments indicate an expanding market for these products.

The aerosol or pressurized package is rather unique in design and function, and it seems appropriate for this publication to devote some space in the months ahead, to provide more information on the components and factors involved in the aerosol paint field, by specialists in the field. Some of the subjects under consideration are listed below.

Factors

Product Formulation—The composition of an aerosol coatings is basically governed by the intended use of the finished product, but there are a number of factors and peculiarities which must be taken into consideration in the final formulation filled into the container. The basic formulation must be tailored to the propellent, valve, container, and filling procedure, to assure reasonable shelf life, a satisfactory spray pattern, and a finished coating of durable quality. Problems are likely to be encountered with each factor, and there are numerous pitfalls to be avoided.

Valves—There are a number of valves available, and different variations of each style. The basic principles involved, and the choice of the most suitable valve for the proposed purpose, are important factors to consider in the development of a final product.

Propellents—There are a number of basic propellents, fluorocarbons, hydrocarbons, and non-liquefied compressed gases, or combinations, which can be used to power the package. Each propellent has its own fundamental characteristics, which must be taken into account, to produce the final desired effect.

Containers—Outward appearance, physical strength, and compatibility with the product are factors governing the selection of the container to be used. There are several types available, including drawn steel, conventional fabricated tin plate cans, extruded aluminum, glass or plastic. Sizes range from one or two-ounces up to 16-ounce capacity at present, with the possibility of larger sizes to be available.

Test Methods—A number of methods have been developed for aerosol coatings specifically, and other methods have been adapted from established methods in the industry. These test methods can be used to evaluate formulations, storage stability, spray patterns, spray delivery, finished coatings and other characteristics important in the development of the finished product.

Filling—Aerosol products require specialized filling procedures, equipment, and "know-how". It is often advantageous to use the services available by aerosol custom loaders, since they are experienced in the field, and have the equipment and skill necessary for this specialized operation. A complete aerosol filling line is fairly expensive, and not economically feasible for individual producers, unless a reasonably large volume is involved.

Marketing—Merchandising of pressurized paint products may vary considerably from established paint industry practice, and a discussion of some of the various factors involved would be of considerable interest to all concerned.

Safety—There are some characteristics inherent in aerosol containers, which can involve hazards in the plant, in shipping and storage, and to the consumer. The association with the word "bomb" has been avoided by the aerosol industry, for obvious reasons, but nonetheless, there is a fair amount of "horsepower" wrapped up in this small package. Under abnormal conditions, or improper handling, an aerosol container can produce considerable damage to persons or property. The overall safety record of the aerosol industry has been excellent, but it would be appropriate and desirable to cover some of the precautions and educational measures which should be maintained to preserve this record.

New Developments—In the rapidly expanding field of aerosol paints, there are and will continue to be new products and improvements. It is intended to report these developments as soon as possible after they are released, to keep industry informed of progress in this field.

Courtesy American Can Co.

Lab tests valves in hot water.

Chemical Specialties Manufacturers Assn. Holds Aerosol Clinic

THE Chemical Specialties Manufacturers Assn. held an aerosol industry clinic in New York and Chicago, October 17 and October 24. The association's purpose is to provide up-to-date technical information on pressure filling operations to industry members, especially junior level management, operators and technicians.

Several noteworthy papers were presented by various members arousing much acclaim from those in attendance. The subjects and speakers included:

Aerosol History and Marketing—R. A. Crane
- Development of the Market—1946 Through 1951
  - Marketing "Firsts"
  - Industry Achievements
- Expansion of the Market—1952 Through 1958
  - Reasons for Success
  - Principal Products
    - Insecticides
    - Shave Lather
  - Other Aerosol Products—Nonfood
  - Other Aerosol Products—Food
- Total Dollar Market
  - Insecticides—All Types
  - Shave Lather—All Types
- Recent Studies of the Aerosol Market
- The Future Aerosol Market

Aerosol Principles—F. A. Mina
- Definitions and general description
- Product Types Available in Aerosol Form
- Components of the Pressurized Package
  - Containers
  - Valves
  - Propellents
  - Product Base
- Aerosol Systems
  - Review of several systems
  - Mode of action of each type

Aerosol Propellents—L. T. Flanner
- Function of Propellent
- Types of Propellents
- Fluorinated hydrocarbon propellents
  - Production methods numbering system
  - Physical properties
  - Appearance
- Historical
  - High Pressure "bug-bomb"
  - Early types low pressure aerosols
  - Refinements
- Types of Containers
  - Metal
    - Fabricated
      - 1" opening
    - Double seamed tops with staked valves sizes
    - Drawn
      - Extruded (aluminum)
    - High Pressure
    - Glass
      - Uncoated
      - Coated
- Hydrolytic stability

L. T. Flanner Head of Aerosol Technical Service Laboratory, General Chemical Div., Allied Chemical Corp. and D. C. Geary, Tech Service Laboratory, Union Carbide Chemicals Co.

George Barr, Vice Chairman of Aerosol Div., CSMA and E. J. McKernan Chairman address the clinic held in Chicago.

- Container or Cylinder handling in plant
- Bulk handling

Compressed gas propellents
- Use
- Production techniques
- Physical properties
- Containers

Hydrocarbon propellents
- Uses
- Physical properties
- Containers

Safety in propellent handling

Aerosol Containers—J. J. Buchanan

Scope

General Container Requirements
- Strength
- Product Protection
- Plastic

Components of Metal Containers
- Plate
- Tinplate
- Weights (base box definition)
- Tin coating
- Electrolytic—#25, #50, #75, #100, differential
- Hot dipped—1.25#, 1.50#
- Terneplate
- CMQ
- Chemistry
- Type L
- Type MR
- Type MC
- Temper
- T-1, T-2 uses
- T-3, T-4 uses
- T-5, T-6
- TU (continuously annealed)
- Aluminum
- Thickness
- Alloys
- Uses

Protective Coatings
- Purpose
- Inside enamels
- Olsoresinous
- Phenolics
- Epoxies
- Vinyls
- Double coats
- Side strips
- Inside
- Outside
- External coatings

Compounds
- Purpose
- Requirements
- Types

Solder
- Low tin
- 10% tin
- Flux

Can Manufacture

Product-Container Relationship
- General considerations
- Strength considerations
- Glass
- Drawn or extruded cans
- Fabricated cans

Corrosion
- Types and examples
- Detinning
- Perforations
- Staining
- Aluminum

Coating Problems
- Softening
- Loss of Adhesion

Sanitary and toxicity considerations

Selecting the container
- Shelf-testing
- Importance
- Temperatures
- 70°F
- 100°F
- 130°F
- Aids
- Corrosivity testing
- Product analysis
- Role of container supplier

Aerosol Valves—W. C. Beard, Jr.

What the Valve Does

Speakers at CSMA Aerosol Clinic in N. Y.: (top) J. H. Beacher, Avon Products, Inc.; W. C. Beard, Risdon Mfg. Co.; Joseph J. Tomlinson, General Chemical Div., Allied Chemical Corp.; E. J. McKernan, E. J. McKernan Co., chairman Aerosol Div., CSMA; D. Tillotson, Pennsalt Chem. Corp.; (bottom) A. H. Lawrence, "Freon" Products Div., DuPont Co.; J. Buchanan, Aerosol Development Section, Continental Can Co.; R. T. Ferry, Cartridge-Pack Co.; R. A. Crane, Market Research Mgr., "Freon" Products Div., DuPont Co.; Dr. F. Mina, Lodes Aerosol Consultants.

- On-Off rate
- Expansion of formulation
- Classification into spray and foam types

Valve Components
- Description
- Materials of construction
- Can versus bottle valves
- Method of crimpting

Spray Valves
- Illustration of flow and expansion of formulation
  - Simple can valve
  - Simple bottle valve
- Spray pattern and particle size?
- "Vapor Tap" valve

Foam Valves
- Single expansion
- Toothpaste, food, steam dispensing, etc.

Mechanical Break-up Valve Actuator
- Why needed
- Illustration of swirl and break-up action

Metering Valves
- Illustration of operation
- Positive displacement types

Top—Formulation Panel
Fred Presant, Aerosol Techniques, Inc.; M. Fowks, Power-Pak, Inc.; P. M. Prussak, Associated Brands, Inc.

Bottom—Commercial Filling Method and Problem Panel
J. Hart, J. C. Stalfort & Sons, Inc.; A. Iannacone, Fluid Chemical Co., Inc.; A. Osman, Thomasson of Pa., Inc.

W. C. Beard, Director of Research of Risdon Mfg. Co., discusses aerosol valves.

Aerosol Laboratory Operations —
D. C. Geary
Definition of an Aerosol Laboratory
Formulating
Packaging Sequences and Equipment
Testing Equipment
Laboratory Budget
Laboratory Materials Handling
Laboratory Safety
Analytical Equipment
Organization of Laboratory Personnel
General Laboratory Facilities
Technical Library
Customer Service
Quality Control

WINNER of Aerosol Paint Packaging Contest was Craftent Mfg. Co. Award was made by Aerosol Div., Chemical Specialties Mfrs. Assn. on Dec. 8, 1959 ni Washington, D. C.

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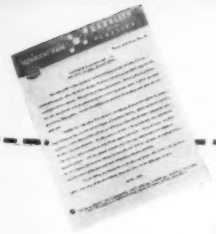
You can't beat vinyl coatings for protection. But on rusty metal, they used to call for sandblasting or other expensive surface preparation first.

Not any more. Now Union Carbide Plastics laboratories have developed two new systems that work with wirebrushing alone. One is based on a phenolic primer that can be sprayed or brushed on. The other uses a vinyl wash primer. The phenolic/vinyl system is more economical, but the vinyl primer is recommended where continuous exposure to salt or fresh water is expected.

Test data, available with sample formulations, show that either system works well over clean or rusty steel. Both have prevented spread of underfilm corrosion for at least 30 months, the length of the test. Test panels were exposed to Florida sun and Pittsburgh atmosphere, and the coatings got two years of actual industrial usage.

In every case, the excellent gloss retention and durability of the vinyl top coat augmented the high corrosion resistance and adhesion of the primer, while other top coatings showed chalking and fading.



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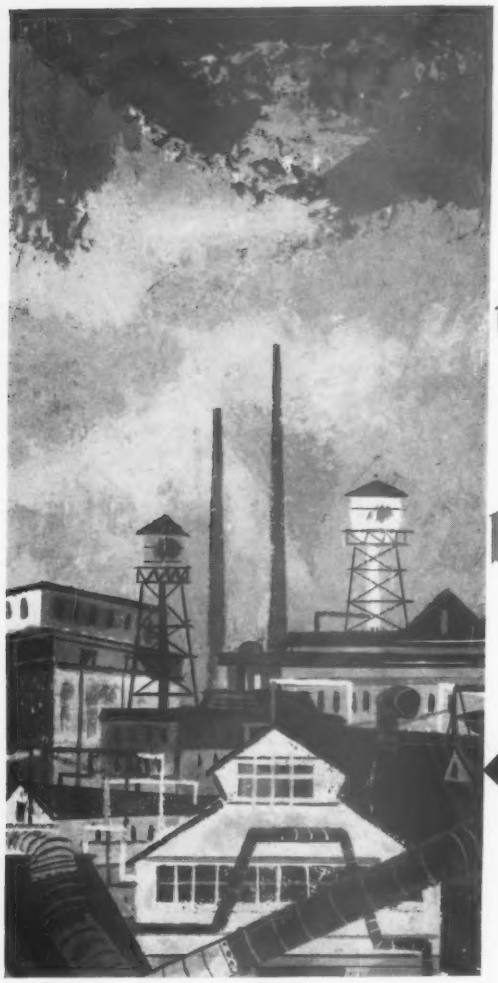

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Paint manufacturers who want to maintain quality control clear through to end use, ship their paints and coating vehicles in Vulcan Steel Containers. Vulcontainers protect quality, and save money, too. They're available for immediate shipment, in any quantity. Sizes run from 1 through 55 gallons, and Vulcan has an exceptionally wide selection of styles, closures, colors and Hi Bake linings. Write today, to learn how you can give your paints a better send-off and save money, too!

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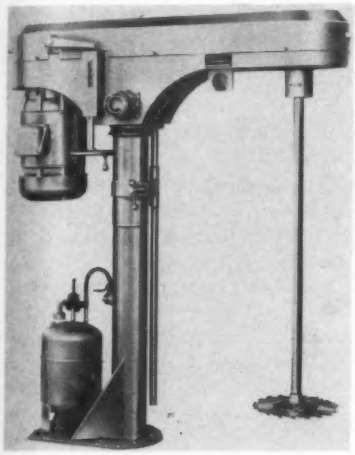
NEW EQUIPMENT AND MATERIALS

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.



MOREHOUSE-COWLES

DISSOLVER
Variable Pitch Diameter

New dissolver models for mixing, dispersing and deagglomerating, feature a new, unique power transmission system capable of delivering over 90% of motor horsepower to the impeller even at lowest speeds.

Designated as the "MPD" (Maximum Power Delivery) transmission system, the unit employs variable pitch diameter pulleys and belts to maintain maximum available horsepower at any selected speeds. Speed may be changed during or between batches without appreciable loss of horsepower capacity.

Maximum horsepower can be delivered over a full range of speeds regardless of changing physical characteristics, such as viscosities, in materials being processed.

Motor size is determined in relation to batch size, impeller size and speeds required for products involved. This determination assures important savings through the use of the proper size motor and consequent savings in first cost and power consumption.

Morehouse-Cowles, Inc. EM-1.

MIXING EQUIPMENT
Spark Proof Wheels

New portable models of high speed mixing equipment have been announced.

Model PM 756 will accommodate batches of 300 gallons down to 5 gallons. The unit will center in a 48" diameter tank which will need only 5" clearance underneath. For smaller batches such as 55 gallon

SPECIALTY

drums, the legs will straddle the container.

The mixer is equipped with spark proof and solvent proof plastic wheels and casters. A snap action floor lock is provided which instantly converts the mixer into a fixed unit.

Single speed models operate at 1800 rpm. Variable speed models operate from 800 to 3600 rpm. An assortment of blades is supplied with each unit and a quick-change system permits selecting the exact blade for any condition.

Specialty Machinery Corp. EM-2

MELAMINE-ACRYLIC RESIN
For Industrial Finishes

New melamine-acrylic resin for industrial and automotive finishes, "Melaqua 600," is being produced and marketed to paint manufacturers.

Only pigment and water need be added to the resin to produce a ready-to-spray enamel that excludes the use of solvents and dryers, thus eliminating fire hazards.

With "Melaqua 600," baked enamel films show exceptionally good flow and levelling, high gloss, and clearer and brighter colors than solvent enamels with the same pigmentation. The enamels have excellent color retention under heat and light.

Outdoor durability is on a par with that of the highest quality melamine-alkyd finishes. Recommended baking schedule is 30 minutes at 300°F.

Suggested uses for this new resin are full color, pastel, metallescent automotive and industrial finishes.

American Cyanamid Co., Plastics and Resins Div. EM-3.

VAC-U-LIFT

TRUCK ATTACHMENT
Adjustable Pads

New, improved, low cost fork truck attachment utilizing vacuum for fast, safe, economical handling of barrels, plate, sheet or stone.

The attachment is ruggedly conconstructed and entirely self-contained with four 10" pads mounted directly to the frame which slips

easily onto the forks of the truck. The pads are adjustable from 19" to 29" the long way of the fork, and from 20" to 28" between the forks. Lifting capacity of each pad is 500 lbs. a total capacity of 2,000 lbs.

Power is furnished by a gasoline engine which drives the vacuum pump and contains its own patented reserve vacuum system to assure safety in the event of an engine failure. The pendant control panel is in easy access to the truck operator.

Optional equipment includes an electric starter for the gasoline engine or various size beams for larger material handling. The fork truck attachment is now in production and is available for prompt delivery.

The systems are currently used to handle materials from a few ounces to several tons and are used extensively in handling steel plate, tanks, concrete, structural steel, glass, as well as many other nonporous materials.

Vac-U-Lift Co. EM-4.

RESIN
Five-Minute Drying

Development of a rapid air-dry resin for industrial top coats that set tack free in about five minutes and hardens into a tough, glossy finish without baking was announced.

The new resin, "Aroplaz 6006," is a pure oxidizing oil modified alkyd.

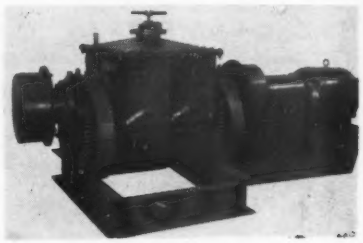
With "Aroplaz 6006," industrial finish formulators can offer enamels with lacquer-speed dry as well as application features and performance characteristics never before possible, the company says.

The five-minute tack free drying time of "Aroplaz 6006" compares with 10 minutes for a very fast styrenated alkyd and 30 minutes for a very fast pure alkyd.

Not only does "Aroplaz 6006" set faster than any comparable vehicle but it also has the flexibility, durability and color retention of conventional alkyd enamels.

The resin was developed for finishes for farm and construction machinery, trucks, trailers, cabinets, metal furniture, toys and other metal industrial and consumer items. Because of its air-drying speed, fast tape time and recoatability, "Aroplaz 6006" is ideally suited for automobile repainting.

Archer-Daniels-Midland EM-5



SCHUTZ-O'NEILL

VIBRATING BALL MILLS
High Velocity Vibration

New line of German-made vibrating ball mills which pulverize, micronize and mix to critical standards a wide range of materials in either wet or dry state is now being offered to North American industries.

Adaptability of the new mills to milling and mixing requirements of many different types of raw and process materials, regardless of abrasiveness, hardness, toughness or compactness, plus higher output with reduced milling time as compared to conventional ball mills, and low operating cost, are advantages claimed by the manufacturer for these machines. The complete line includes six batch-loaded mills (from a one pint laboratory model to a 55-gallon production model) and four continuous system models which may be used in conjunction with external classifiers for maximum output with critical levels of fineness.

The new machines, said to be a major advance in machinery for particle size reduction and homogeneous mixing, employ a principle of intense, high velocity vibration which forcibly agitates the milling medium in the grinding chamber to reduce the material being processed by crushing, shearing, grinding and attrition. Milling media and chamber liners are readily changed to adapt the mills to the particular requirements of various materials.

The mills are in widespread use in Germany and other parts of Europe in the chemical, ceramics, pharmaceutical, mineral, plastics, metallurgical, food and other industries.

Schutz-O'Neill Co. EM-6

NEW MATERIALS — EQUIPMENT

MAGNESIUM SILICATE
Fine Particle Spray

Magnesium silicate is a fine controlled particle size pigment having an average particle size of only 2.3 microns.

The combination of its small particle size, "platey" structure and an oil absorption of 65-72 (Gardner-Coleman) make it especially adaptable as an aid to flatting efficiency and as an additive to control gloss.

Having a Hegman of 5½-6, combined with its good wetting properties and absence of agglomerates, it is a stir-in pigment which readily disperses and rapidly develops a paint of high consistency exhibiting a "buttery" feel.

Recommended for use in the field of industrial finishes it is likewise adaptable to such finishes as satin finish or egg shell enamels, finishes where a low sheen is required or as an additive where a reduction of gloss is needed.

It exhibits the following special properties:

1. Good white color.
2. Excellent suspension properties—aids in the suspension of prime pigments—exhibits good shelf-life.
3. Non-reactive in presence of acids and alkalis.
4. Is a stir-in pigment.—Only sufficient mixing to effect adequate wetting and dispersion is required.
5. Paint films exhibit toughness and good adhesion.
6. Aids in flatting—controls gloss.
7. Shows improved sanding properties—chipping when scratched is considerably decreased.
8. Exhibits and helps in the development of thixotropic consistency.

International Talc Co., Inc.
EM-7

WALKIE TRACTOR
For Short Runs, Confined Areas

New electric tractor is a walkie-type model that can also be used as a standup rider when desired. Recommended for economical movement of stock and merchandise in

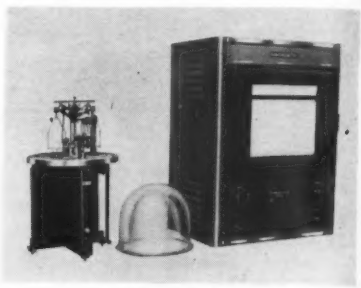
plants and warehouses, it is suited especially for short runs and for use in confined areas where rapid movement of trailer loads is demanded. Free of exhaust fumes, it is suitable for use where air contamination is prohibited.

The short turning radius, narrow width of 27½″ and length of only 46¾″ without the coupler makes the tractor highly maneuverable and easy to handle. The tractor operator will like its quick response through 2-speeds forward and 2-speeds reverse, with pushbutton type controls placed at finger's reach on the steering handle. A 7″ high platform allows the operator to ride and steer the truck easily without fatigue or the effort of walking along with the vehicle.

The new tractor features a new gear drive designed as a single package unit with drive motor, transmission, drive wheel and brake mounted in a vertical column and held to the truck chassis with only four bolts.

Powered by a 12-volt battery, the tractor has ultimate drawbar pull of 550 pounds with rolling capacity of 10,000 pounds. The spring-loaded steering handle applies a 7″ automotive brake when placed in vertical or horizontal position. A switch prevents forward-reverse drive power from being applied while the brake is on. Wheels are rubber tired for positive traction. Weight is 910 pounds without battery.

Barrett-Cravens Co. EM-8



AINSWORTH

VACUUM BALANCE
Semi-Micro and Analytical Models

New automatic recording vacuum balance is said to be able to weigh samples in air or inert gases; at atmospheric or reduced pressures; at room or higher temperatures; on the balance pan or suspended below the balance in a furnace for thermogravimetry or differential thermal weighing.

Weights are built into the balance and are operated by controls outside the vacuum chamber. The recorder, developed last year for use with standard analytical balances, charts weight, or weight and temperature against time.

The vacuum balance is available in semi-micro and analytical models. The semi-micro unit has a capacity of 100 g., sensitivity of 1/100 mg., and a range of automatic weight operation of 400 mg.; the analytical, 200 g., 1/10 mg., and 4000 mg. respectively.

Wm. Ainsworth & Sons. EM-9

PLASTICIZERS
Low Viscosity

D I—(2-ethylhexyl) isophthalate (DOIP) has been added to the list of plasticizers available from Eastman Chemical Products, Inc. A high quality primary plasticizer for both direct compounding and plastisol formulations, DOIP compares favorably in performance characteristics with the well known dioctyl phthalate (DOP).

The plasticizer efficiency of DOIP in poly (vinyl chloride) is excellent. Film comparisons with DOP plasticized material show very close agreement in most physical pro-

perties, although DOIP plasticized films have a lower volatility loss on heat aging and are slightly more resistant to water extraction.

In plastisol formulations with poly (vinyl chloride) DOIP gives a lower viscosity than DOP while the physical properties of the two cured films are essentially the same. DOIP plastisols have very good viscosity stability during aging at room temperature.

DOIP is also compatible with cellulose nitrate, ethylcellulose, chlorinated rubber, polystyrene, and cellulose acetate butyrates of high butyryl content. Some typical properties of Eastman's dioctyl isophthalate are as follows:

Color, APHA, p.p.m.	20
Acidity, as isophthalic, %	0.003
Ester content, %	99.4
Ash	0
Boiling point, 760MM, OC	358

Eastman Chemical Products, Inc. EM-10

DEFOAMERS
General Use

Development of three new defoamers for general industry and paint systems was announced.

The new products, all designed for general defoaming use, were also found to be especially effective for specific industries. "Eldofoam 2892" and "Eldofoam 1961," both non-ionic and completely stable, were found to be unusually successful for various latex systems such as butadiene, styrene, PVA and acrylic. "Eldofoam 3503," a special product developed for general defoaming use in latex systems, was also found to be especially effective in the adhesive field.

Foremost Food and Chemical EM-11

CAN SORTER
High-Speed Unscrambling

Automatic can sorter features a unique magnetic pulley to turn the cans so open ends are all in the same direction, ready for the filling cycle.

In operation, scrambled cans are fed into the bottom of the can sorter. Oscillating rubber "sweeps" lay the cans end-to-end in rubber-covered channels or flights. These flights lift the aligned cans, with their ends at random, to the top of the can sorter where they are released in rows to single file carrier belts which carry the cans to final sorting mechanism—the magnetic pulley.

The magnetic pulley, acting on the greater mass of the can bottom, properly orients the cans and feeds them to a can elevator or directly to the filler conveyor.

Models are available to handle all standard cans up to 32 ounces, or any group of can sizes provided the smallest can is approximately one inch longer than the diameter of the largest can. Rubber bin sweeps and rubber-edge flights protect the finish of the cans and will not bend or damage open ends.

George J. Meyer Co. EM-12

CIRCULATING PUMP
30 to 55 Gallon Sizes

To answer the need for pumping and circulating reasonably light viscosity materials from open end drums and tanks, new circulating pump has been developed. There are no priming problems here because the pump is completely immersed in the liquid. The centrifugal design delivers a smooth, non pulsating flow. Volume may be regulated at will.

Clip here

READERS' SERVICE

Use this handy self mailer to obtain further information on the new raw materials and equipment discussed in this section.

Check desired items below; write name and address on reverse side; and mail.

Clip here

Items

☐ EM-1	☐ EM-6	☐ EM-11
☐ EM-2	☐ EM-7	☐ EM-12
☐ EM-3	☐ EM-8	☐ EM-13
☐ EM-4	☐ EM-9	☐ EM-14
☐ EM-5	☐ EM-10	☐ EM-15

The air motor-driven model is explosion proof and output may be varied by regulation of the air volume. These extra long models can be used with lacquers, light viscosity printing inks, coating compounds, oils and paints.

They are available in lengths for 30 gallon and 55 gallon size drums and shorter lengths. The ½ H.P. sizes deliver 20 G.P.M. at a 22′ head. The ¼ H.P. sizes deliver 10 G.P.M. at a 16′ head, with a 300 S.S.U. liquid. Various flanges and special tanks are also available.

Graymills Corp. EM-13.

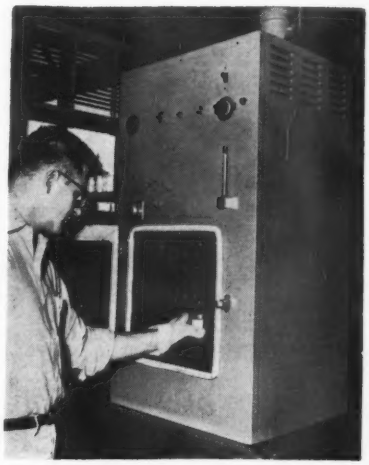
GEAR DRIVES
Reduced Vibration

A major improvement in gear drives for vertical fluid mixers is announced. The mixers are now available with gear drives having case hardened, precision-ground gears for greater load-carrying capacity and longer life, with reduced sound level and vibration.

The gearing has a degree of accuracy of tooth profile, profile spacing, and surface finish never available before. "Running-in" periods with resulting wear are eliminated. Dynamic load factors are reduced and gearing has a greater load-carrying capacity.

This new process also reduces gear noise to a point where normal conversation is possible even in multiple installations and confined areas. Vertical fluid mixers are made in standard models ranging from 1 hp to 200 hp and special models up to 500 hp. Mechanical seals or packed stuffing box may be specified and paddle or turbine-type impellers are available.

Philadelphia Gear Corp. EM-14.



ELECTRIC HOTPACK

SAFETY OVENS
Blowout Panel

Designed with temperature ranges from 35°C to 280°C, new safety ovens permit safe testing and conditioning of volatile paints and lacquers with virtually all danger to personnel and equipment eliminated.

Built-in safety features include automatic overtemperature protection, explosion proof latches and unique blowout panel mounted on the rear of the cabinet. In normal operation, the blowout panel provides a positive chamber seal; However in the event of explosion or sudden pressure build up within the chamber, the blowout panel is released into a steel cage located on the back of the cabinet. The door of the oven remains closed to shield personnel and equipment in front of the cabinet from the contents of the chamber.

An extra margin of safety is provided by low surface temperature heaters and forced air circulation, which provides three air changes per minute within the chamber to prevent storage of explosive fumes and vapor.

Electric Hotpack Company, Inc. EM-15

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READERS' SERVICE DEC. 1959

To obtain further information on the new raw materials and equipment covered in this section, simply mark reverse side, clip coupon, fold, and mail.

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Title .....

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PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries $1.00 per copy) to the publisher.

Pigment Dispersions

U. S. Patent 2,907,670. Leon Katz, Springfield, N. J. Adolph Fuerst, Brooklyn, N. Y., and Robert E. Brouillard, Westfield, N. J., assignors to General Aniline & Film Corporation, New York, N. Y., a corporation of Delaware.

$$R-\left[\left(CHR'-CHR'-O\right)_x-H\right]_n$$

Process for the preparation of pigment dispersions, which comprises mixing an aqueous mass of pigment with a nonionic dispersing agent of the general formula wherein R is the residue of an organic hydrophilic compound having at least one active hydrogen, R′ is selected from the group consisting of hydrogen and lower alkyl radicals, *x* represents the number of moles of alkylene oxide condensed with the parent organic compound and is an integer in the range of 6 to 100, and *n* corresponds to the number of active hydrogen atoms in the parent compound and is an integer in the range of 1 to 4, at a temperature between 60 and 100° C. until a pigment particle size of from 0.1 to 2.0*u* is attained, and adding to the resultant mass water in an amount sufficient to form a flowing paste.

Modified Epoxide Resins

U. S. Patent 2,908,664. William J. Belanger, John E. Masters, and Darrell D. Hicks, Louisville, Ky., assignors to Devoe & Raynolds Company, Inc., a corporation of New York.

A process for preparing a resin which comprises heating and reacting a glycidyl polyether of a polyhydric compound selected from the group consisting of polyhydric phenols and polyhydric alcohols, said polyether containing more than one epoxide group per molecule and having a weight per epoxide below 1000, a polycarboxylic acid anhydride and a monohydric phenol in a ratio of two epoxide equivalents of glycidyl polyether to from 0.1 to 0.8 mol of monohydric phenol to from 1.9 to 1.2 equivalents of polycarboxylic acid anhydride, considering an epoxide equivalent as the weight in grams of glycidyl polyether per epoxide group, and an anhydride equivalent as the weight of acid anhydride in grams per anhydride group.

A process for preparing a resinous composition which comprises condensing a polycarboxylic acid anhydride and a glycidyl polyether of a polyhydric compound selected from the group consisting of polyhydric phenols and polyhydric alcohols, said polyether containing more than one epoxide group per molecule and having a weight per epoxide below 1000, with the product resulting from the reaction of one mol of a mono-hydric phenol with two epoxide equivalents of glycidyl polyether of a polyhydric compound selected from the group consisting of polyhydric phenols and polyhydric alcohols and also containing more than one epoxide group per molecule and having a weight per epoxide below 1000, the reactants being present in the resinous composition in a ratio of two epoxide equivalents of glycidyl polyether to from 0.1 to 0.8 mol monohydric phenol to from 1.9 to 1.2 equivalents of polycarboxylic acid anhydride, considering an epoxide equivalent as the weight in grams of glycidyl polyether per epoxide group, and an anhydride equivalent as the weight of acid anhydride in grams per anhydride group.

Vinyl-Acrylonitrile Lacquer

U. S. Patent 2,906,721. Herbert Malin, Pawtucket, R. I., and Herbert C. Roehrs, Beaverton, Mich., assignors to The Dow Chemical Co., Midland, Mich., a corporation of Delaware.

The method of preparing a lacquer of a normally crystalline copolymer of vinylidene chloride and acrylonitrile consisting of dissolving in a solvent from 5 to 25 percent by weight of a wet copolymer composed of from about 85 to 95 percent by weight of vinylidene

chloride and a complementary amount of from about 15 to 5 percent by weight of acrylonitrile, said wet copolymer containing intermixed therein from about 5 to about 35 percent by weight of water, said solvent consisting of at least 75 percent by weight of tetrahydrofuran with any remainder being an organic solvent miscible with tetrahydrofuran.

Process of Making Polyethylene Film Recemptive to Organic Coating

U. S. Patent 2,909,443. Leon E. Wolinski, Buffalo, N. Y., assignor to E. I. du Pont de Nemours and Company, Wilmington Del., a corporation of Delaware.

A process for making polyethylene film receptive to organic coatings which comprises embedding colloidal silica particles in the surface of the pre-formed film while maintaining the points of embedment on the film in an amorphous state, said particles having their greatest dimension no greater than one-half the thickness of the film and not to exceed 50 microns, to form a product having a degree of transparency and a surface texture substantially equivalent to the film prior to embedment.

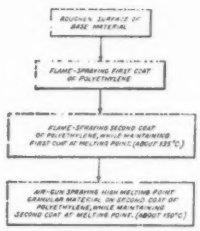
Polymethylol Melamine

U. S. Patent 2,906,724. John H. Daniel, Jr., Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y., a corporation of Maine.

A composition of matter capable of producing glossy, continuous films comprising a mixture of (1) 50% to 10% by weight of a water-soluble potentially thermosetting polymethyl ether of a polymethylol melamine and (2) 50% to 90% by weight of a water-soluble ammonium salt of a copolymer comprising (*a*) 5% to 50% by weight of an ethylenically unsaturated carboxylic acid and (*b*) 50% to 95% by weight of an alkyl ester of an alpha, beta-ethylenically unsaturated monocarboxylic acid. Polymethylol melamine.

Coating Process

U. S. Patent 2,907,671. Charles Duvivier, Paris, France, assignor of twelve and one-half percent each to John Potter, Paris, France, and George A. Barnes, Potomac, Md.



A process for coating a material with a high melting point compound comprising: applying a low melting point polyethylene by flame-spraying said polyethylene upon said material, maintaining the applied polyethylene at a temperature of at least said last-named low melting point temperature, projecting said high melting point compound against said applied polyethylene while said applied polyethylene is maintained at at least its softening point temperature, said high melting point compound being cold and in fine granular form during said projecting step, whereby said compound is firmly adhered to the surface of said material by said polyethylene.

Aqueous Colloidal Dispersions

U. S. Patent 2,898,317. Robert L. Johnson and Dale N. Robertson, Midland, Mich., assignors to The Dow Chemical Co., Midland, Mich., a corporation of Delaware.

1. An aqueous colloidal dispersion comprising (1) a synthetic latex containing in the disperse phase a polymer of at least one olefinically unsaturated monomer and (2) from about 0.005 to 1 percent by weight of an aromatic nitroalkanol wherein the aliphatic portion of said nitroalkanol contains no more than 7 carbon atoms and has the nitro and hydroxyl groups on adjacent carbon atoms and wherein the amount is based on the total weight of aqueous colloidal dispersion.

Wax Compositions

U. S. Patent 2,906,443. Wildon T. Harvey, Hockessin, Del., and Seymour W. Ferris, Mount Holly, N. J., assignors to Sun Oil Co., Philadelphia, Pa., a corporation of New Jersey.

A wax composition consisting essentially of from 70% to 85% of a paraffin

wax having a melting point of from 125°F. to 132°F., a penetration at 77°F. of from 17 to 23, a viscosity at 210°F. of from 36 to 39 SUS and a modulus of rupture at 73°F. of from about 270 to 340, and from 15% to 30% of a paraffin wax having a melting point of from 148°F. to 154°F., a penetration at 100°F. of from 13 to 19, a viscosity at 210°F. of from 40 to 46 SUS, and a modulus of rupture of from about 340 to 400.

Process For Rendering Masonry Water-Repellent

U. S. Patent 2,905,562. Donald V. Brown, Schenectady, N. Y., assignor to General Electric Co., a corporation of New York.

An aqueous solution for rendering masonry water-repellent consisting essentially of, by weight, (*a*) water, (*b*) from 0.25 to 10% of an alkali-metal salt of a hydro-carbon-substituted silanetriol calculated as RSiO---- where R is a monovalent hydrocarbon radical, and (*c*) from 1.25 to 30% of an alkali-metal silicate, the weights of (*b*) and (*c*) being based on the total weight of the aqueous solution.

Chloroethylene Polymer Ethers

U. S. Patent 2,906,727. David A. Gordon, Midland, Mich., assignor to The Dow Chemical Co., Midland, Mich., a corporation of Delaware.

A thermally stable composition comprising a chloroethylene polymer and from 1 to 10 percent of an ether selected from the group consisting of dibenzhydryl ether, di-9-fluorenyl ether, and a dibenzhydryl ether having a nuclear substituent on the phenyl groups, said nuclear substituents being selected from the group consisting of alkyl having not more than 8 carbon atoms, alkoxy having not more than 8 carbon atoms, alkoxy having not more than 8 carbon atoms and a halogen.

Coating Composition of Asphaltenes and Plasticizer

U. S. Patent 2,909,441. Marion W. Pickell, Bartlesville, Okla., assignor to Kerr-McGee Oil Industries, Inc., a corporation of Delaware.

A protective coating composition comprising from 25 to 50% by weight of asphaltenes and 75 to 50% by weight of solf asphaltic bituminous material based upon the combined weight of asphaltenes and asphaltic bituminous material, the composition containing sufficient asphaltenes to render the composition non-homogeneous.

Treatment of Hydrocarbon Drying Oils With Epoxidized Trigyceride Oils

U. S. Patent 2,907,669. George H. Tulk, Jr., Elyria, and Theodore A. Neuhaus, Rocky River, Ohio, assignors to the Glidden Company, Cleveland, Ohio, a corporation of Ohio.

A novel film-forming composition of matter having improved properties, comprising a homogeneous mixture of (*a*) synthetic polymeric sodium-polymerized hydrocarbon drying oil prepared from 60-100% C_4C_6 conjugated diolefin, balanced monocyclic vinyl aromatic monomer and (*b*) from about 5% to 50% by weight on said drying oil of epoxidized triglyceride oil selected from the group consisting of drying and semi-drying oils, said epoxidized oil having an oxirane oxygen content between about 2% and 7% by weight.

Drying Oils

U. S. Patent 2,909,537. Herbert Walter Chatfield, Croydon, England, assignor to A. Boake, Roberts & Company Limited, London, England.

A process for the production of improved drying oil compounds, which comprises heating an acid mixture derived from an oil selected from the group consisting of drying and semi-drying oils, mixtures of drying oils with non-drying oils and mixtures of semi-drying oils with non-drying oils, together with an epoxidised ester selected from the group consisting of the glyceride and higher polyhydric alcohol esters of acids having an iodine value not less than 80 in which the unsaturation has been at least partially removed by the formation of epoxy groups across the double bonds and continuing the said heating until a reduction of the acid value of the mixture has been attained.

TECHNICAL Bulletins

DRIERS

Bulletin describes new driers are said to be the first pre-dispersed driers ready for immediate use—free of volatile solvent—on the market. Completely compatible with all commercially available latexes, these driers offer distinct advantages over those previously used in the water paint field. Consisting of extremely fine dispersions of naphthenates in special aqueous media, these driers impart many desirable properties to water thinned paint films:

Increased Scrub Resistance of Dried Finishes, Increased Hardness, Improved Resistance to Water Spotting, Improved Resistance to Water Spotting, Improved Resistance to Mineral Spirits, Improved Gloss and Color Retention of Baked Finishes, Improved Transparency of Clear Films, Freedom From Pinholing and Pitting, etc.

Harshaw Chemical Co., Dept. PVP, 1945 E. 97th St., Cleveland 6, Ohio.

REDUCTION EQUIPMENT

Two proven designs of size-reduction equipment—the new "Tornado" Mill and the well-established Model 43-B Oscillating Granulator—are described in a new four-page bulletin.

The "Tornado" Mill is a unique whirling-blade vertical-flow granulator with an exclusive 360-degree screen completely surrounding the rotor. It has already demonstrated its versatility in granulating, pulverizing, dispersing, and scrap-recovery (among other applications) on chemicals, ceramics, pharmaceuticals, plastics, powder metals, pigments, food products, and a wide range of other materials. Several of these applications are discussed in the new bulletin. Also included is a graphic comparison of the output of the "Tornado" Mill and a conventional mill, in terms of pounds of usable material processed per hour.

The Model 43-B Oscillating Granulator is known throughout industry for its outstanding performance, particularly in the processing of extremely friable and other "problem" materials, on which it gives superior screen analyses.

Complete specifications for the two sizes of "Tornado" Mill now available are given in the bulletin. F. J. Stokes Corp., Dept. PVP, 5500 Tabor Road, Philadelphia 20, Pa.

LATICES

A comprehensive 30-page technical bulletin, covering in detail the product performance of "Dylex K-31," an improved styrene-butadiene copolymer latex designed to produce superior interior paints at low cost, has been issued.

Divided into three main sections, this bulletin details such pertinent information as particle size, foam, water resistance and scrubbability, as well as presenting method of preparation and giving paint evaluations.

Pictures, graphs and charts illustrate the text and show the results of various tests made with "Dylex" latices and interior paints.

Plastics Div., Koppers Co., Inc., Dept. PVP, 801 Koppers Building, Pittsburgh 19, Pa.

SURFACTANTS

New 44-page booklet, describing the properties and uses of "Tergitol" surfactants, has been published.

The booklet contains extensive data for eight nonionic and four anionic Tergitol surfactants, including selection, solubilities, properties, formulations, applications, performances, specifications and test methods, shipping, bulk storage, and physiological properties. A detailed bibliography and reference section is included.

Both types of surfactants give rapid wetting and penetrating action, but under different conditions. The Tergitol nonionic surface active agents are of the polyethylene glycol-ether type, while the Tergitol anionic surface active agents are basically sodium salts.

Tergitol surface active agents are used in the formulations of adhesives, bactericides, cosmetics, detergents, emulsion paints, fertilizers, fruit washes, gas well treating agents, histological procedures, latex dispersions, leather treatments and finishes, metal cleaners and plating, paper products, photographic chemicals, rubber, sanitizers, silver cleaners, textile processing agents, wallpaper removers, wax polishes, and many other products. Union Carbide Chemicals Co., Dept. PVP, 30 E. 42nd St., New York 17, N. Y.

DRYING EQUIPMENT

New bulletin describes drying equipment available for removal of moisture from low pressure gas or air streams. Fully automatic refrigeration and solid adsorbent dryers are featured and these can be used independently or in combination depending on the end dewpoint required for gas or air streams. Bulletin also contains curves showing percent of moisture by volume at various temperatures and dewpoint related to moisture content per 1000 cubic feet of gas or air. Gas Atmospheres, Inc. Dept. PVP-D-1, 20011 Lake Rd., Cleveland 16, Ohio.

DRIVES

New twelve-page, two-color booklet gives detailed performance and application data on the complete line of all-electric, adjustable-speed V*S Jr. drives. Covering

"U. S." UNITIZED JAR MILLS

Dependable : Low Cost
Easy to Operate

"SELF-CENTERING"* ROLLS

keep containers centered on mill, reduce friction noise, jar wear and breakage. Jars can't creep and fall off.

EASILY ADJUSTED ROLLS

can be quickly positioned to handle jars from 2½" to 13" in diameter, up to 12" long.

SMOOTH-RUNNING OILITE BEARINGS

assure quiet operation and long, trouble-free performance.

STURDY WELDED STEEL FRAME

built for rigorous continuous service. Fully portable, yet heavy enough to stay put.

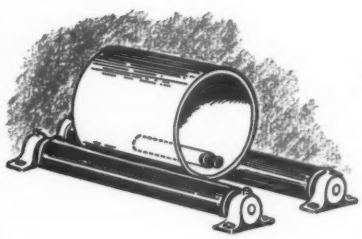
LONG-WEARING ROLLS

made of special Neoprene rubber permanently molded on solid steel core. Resistant to oils, chemicals and solvents.

WIDE RANGE OF STANDARD SIZES

"U. S." offers a wide choice of capacities to meet every laboratory or specialized production requirement. Either constant or variable speed drives are available, as well as other optional features such as tachometers, automatic timers, etc., for utmost adaptability.

*Patented



HANDY HINTS ON JAR MILLING

Extremely small containers, such as test tubes or small paint cans, can easily be rolled on your jar mills by placing them inside a piece of pipe or larger round container.

For additional helpful grinding and mixing data plus complete specifications on "U. S." Jar Mills
WRITE FOR BULLETIN JM-290

104F-1

PROCESS EQUIPMENT DIVISION

U. S. STONEWARE
AKRON 9, OHIO

typical applications employing V*S Jr. drives from 1/8 through 4 horsepower, the booklet is lavishly illustrated with photos and cartoon drawings. Condensed specifications, dimensions, and a gearmotor selection table are included.

Reliance Electric and Engineering Company, Dept. PVP, 24701 Euclid Ave., Cleveland 17, Ohio.

CODING ATTACHMENTS

A complete line of coding attachments, designed to eliminate time-consuming hand stamping of cartons and containers, is described in a new catalog sheet.

Attached to conveying or packaging machinery, units place a code date, price mark, carton identification or other information on cardboard, paper, metal or plastics. Imprints of from ½-inch to 3-inches are made with printing press clarity. New coding attachments are designed for use with rubber type. Individual characters or complete logotypes can be utilized.

Available upon request, the catalog sheet has complete drawings and model specifications to help in determining number and size of unit required. Bell-Mark Corp., Dept. PVP, 18 Ropes Place, Newark 7, N. J.

DISPERSERS

A new brochure, has been issued covering an entire line of high speed, multiple action dispersers.

They are used to mix, dissolve, emulsify, deagglomerate and disperse all types of thin or heavy paste materials including those of high viscosity. The brochure describes the exclusive design of the multiple action millhead. It shows how all of the material is subjected to (1) tremendous direct impact, (2) intense abrasive action, (3) cutting and shredding, (4) attrition and hydraulic shear, and (5) smashing against inner container shell.

The new brochure also illustrates and describes a special adjustment in the millhead which can be adjusted at any time for either coarse or fine dispersion as required. This feature is designed to provide more positive control of processing efficiency for production of either one or many different products in the same machine.

Laboratory and production size equipment is shown in the removable tank type with variable speed motor drives and a hydraulic raising and lowering device. Stationary tank type mixers are also included.

In addition, the new literature incorporates a complete specifications chart on various size units and fully covers construction details and tank sizes. Charles Ross & Son Co., Inc., Dept. PVP, 148 Classon Ave., Brooklyn 5, N. Y.

RESIN SOLVENT

New bulletin summarizes the latest laboratory data on the use of dimethylformamide (DMF) as a PVC resin solvent.

The information will be of particular value to companies manufacturing protective coating formulations. DMF's powerful solvent effect allows use of high resin content solutions giving thicker coatings in roller or spray applications. Its medium range boiling point suggests use in baked-on coatings.

DMF is most advantageously used as a co-solvent in the range of 15 to 35 per cent of the solvent system. It is most effective with the higher molecular weight resins which are not easily dissolved in ketones or aromatics. Use of DMF allows an increase in the solids content for a given viscosity, materially reducing the solvent cost per pound of resin. Industrial and Biochemicals Department, E. I. du Pont de Nemours and Co., Dept. PVP, Wilmington 98, Delaware.

PLASTICS AND COATINGS

Products of The Dow Chemical Company, lists the properties and uses of some 375 industrial, pharmaceutical, and agricultural chemicals currently produced. The listing includes established products and developmental items.

The new edition features an expanded section on plastics and coatings products. New sections are included on oxazolidinones, automotive chemicals, and textile fibers.

Dow Chemical Co., Dept. PVP, Midland, Mich.

GRINDING BALLS

A four-page color bulletin is available that describes in detail the new high density alumina grinding balls offering the industry new advantages; such as 380 specific gravity, zero porosity, and new, tested abrasion and durability qualities. American Refractories and Crucible Corporation, Dept. PVP, North Haven, Conn.

ZINC STEARATE

New bulletin describes the uses and properties of lacquer-grade "Zinc Stearate NB-60."

For use in sanding sealers, the product does away with "bloom" in top coats of synthetic varnishes containing acid catalysts.

Because of fine particle size, the need for costly grinding is eliminated. In addition, high discharge viscosities, common to most stir-in stearates, are avoided.

Typical properties are recommended concertrations are included in the bulletin. Witco Chemical Co., Inc., Dept. PVP, 122 E. 42nd St., New York 17, N. Y.

COATING FORMULATIONS

Formulations for cold applied solvent coatings which contain asphalt-asbestos are compiled in a booklet which is now available.

Contents of the twelve page booklet include: formulations for fibrated aluminum roof coatings, plastic roof coatings, automotive underbody coatings, cold applied mastic for structural steel, paints for railroad overheads, colored asphalt aluminum coatings, plastic cement, gun grade caulking compound and asphalt-asbestos composition coatings. Lake Asbestos of Quebec, Ltd., Dept. PVP, 120 Broadway, New York 5, N. Y.

DYESTUFFS

A complete custom service for the small volume user of dyestuffs is described in a new catalog *Colors for Every Purpose.*

The color compounds listed include U. S. certified pure colors, dyes for the soap and sanitary industry, for the petroleum industry, for the woodenware and basket trade, for the plastic industry, and specially formulated colors which are soluble in water, alcohol, oils, lacquers and plastics. The literature, catalogue R, is available upon request to Pylam Products Co., Dept. PVP, 799 Greenwich Street, New York 14, N. Y.

FORK TRUCKS

New bulletin describes and illustrates in detail rider-type electric and gasoline powered fork trucks, either gas, electric, L.P., or diesel operated, electric platform trucks and electric crane trucks.

The new six-page bulletin is available upon request by writing to Baker Industrial Trucks, A Division of Otis Elevator Company, Dept. PVP, 8000 Baker Ave., N.W., Cleveland 2, Ohio.

CHEMICALS

New October, 1959 price catalog of essential oils, aromatic chemicals and specialties, certified colors is available. This 36-page booklet is published semi-annually and includes short descriptions and uses of various products, as well as addresses and phone numbers of the various branch offices. Dodge & Olcott, Inc., Dept. PVP, 180 Varick St., New York 14, N. Y.

COPOLYMERS

An expanded and comprehensive bulletin on new types of commercially available vinylpyrrolidone/vinyl acetate copolymers and their numerous applications has just been issued. These materials were first introduced as 50 per cent ethanol solutions. They are now available in various physical forms as well as in several monomer ratios. Solid, emulsion and solution types now provide specific materials suitable for diverse processing conditions.

The new bulletin also describes stability factors, viscosity ratings, compatibility and physiological data. Antara Chemicals, General Aniline & Film Corp., Dept. PVP, 435 Hudson St., N. Y. 14, N. Y.

CALENDAR

Feb. 15-17. Meeting of Committee D-1 on Paint, Varnish, Lacquer, and Related Products of the American Society for Testing Materials, Shoreham Hotel, Washington, D. C.

Feb. 16-20. 76th Annual Meeting, Painting and Decorating Contractors of America, Muncipal Auditorium and Hotel Muehlback, Kansas City, Mo.

Feb. 25-27. 5th Symposium, Pacific Paint Production Clubs and Paint Material Equipment Show, Hotel Statler, Los Angeles, Cal.

PRODUCTION CLUB MEETINGS

Baltimore, 2nd Friday, Park Plaza Hotel.
Chicago, 1st Monday, Furniture Mart.
C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Hotel Alms.
Dayton — Nov., Feb., April, Suttmilers.
Columbus — Jan., June, Sept., Fort Haves Hotel.
Cleveland, 3rd Friday, Cleveland Engineering & Scientific Center.
Dallas, 1st Thursday after 2nd Monday, Melrose Hotel.
Detroit, 4th Tuesday, Rackham Building.
Golden Gate, 3rd Monday, Sabella's Restaurant, San Francisco.
Houston, Monday prior 2nd Tuesday, Rams Club.
Kansas City, 2nd Thursday, Pickwick Hotel.
Los Angeles, 2nd Wednesday, Scully's Cafe.
Louisville, 3rd Wednesday, Seelbach Hotel.
Montreal, 1st Wednesday, Queen's Hotel.
New England, 3rd Thursday, University Club, Boston.
New York, 1st Thursday, Brass Rail, 100 Park Ave.
Northwestern, 1st Friday, St. Paul Town and Country Club.
Pacific Northwest, 3rd Thursday, Washington Athletic Club, Seattle, Wash.
Philadelphia, 3rd Wednesday, Philadelphia Rifle Club.
Pittsburgh, 1st Monday, Gateway Plaza, Bldg. 2.
Rocky Mountain, 2nd Monday, Republican Club, Denver, Colo.
St. Louis, 3rd Tuesday, Kings-Way Hotel.
Southern, Annual Meetings Only.
Toronto, 3rd Monday, Oak Room, Union Station.
Western New York, 1st Monday, 40-8 Club, Buffalo.

MOISTURE PERMEABILITY

(*From page 38*)

coats of the same paint are applied to a metal base and the surface is being exposed on one side of the film only, this factor might not be of importance.

The experimental studies agree throughout the work on the fact that the particle size and shape of the pigments has considerable influence on the density of the organic film which is produced, especially on its water vapour permeability.

The tests were made primarily with so-called not reactive pigments, so that these variations in their resistance cannot be the result of chemical reactions between the vehicle and pigments under study. Only in the case of the siliconized pigment there might be a chemical inter-reaction.

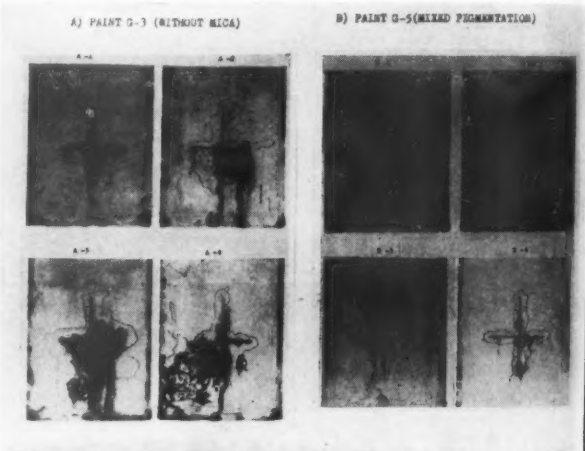


Figure 4. Vinyl alkyd paints: 1000 hours of saltfog exposure.

That the results agree between tests made with various vehicles indicates that these effects of the pigment variations are not limited to certain vehicles.

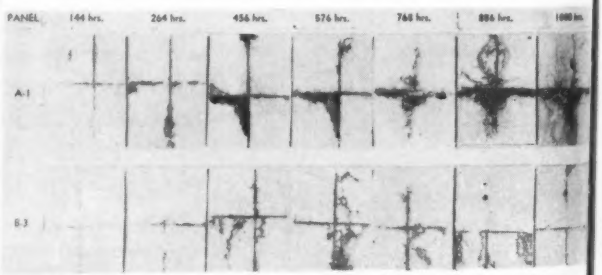


Figure 5. Effect of saltfog exposure on the vinyl-alkyd paints after various hours of exposure.

This paper was presented at the 135th National Meeting of the American Chemical Society, Div. of Paint, Plastics and Printing Ink Chemistry in Boston, April 8, 1959.

Acknowledgements

The author wishes to express appreciation to the Wet Ground Mica Association for assistance in these investigations; and he wishes to thank the following co-workers, who took an active part in the experimental work of these studies; Victor J. Cordones, Ronald P. Distefano, Fred H. Heise, Jr. and Dominick Saccacio.

References Cited

(1) "Reactive Coatings" by M. Kronstein, paper given at the Fall 1958 Northeast Regional Corrosion Conference of the National Association of Corrosion Engineers, in Boston.
(2) "Evaluation of Organic Coatings by Electrographic Printing" by M. Kronstein, M. M. Ward and R. Roper, in Industrial and Engineering Chemistry, Vol. 42, Page 1568 (August 1950).

*Research Div., College of Engineering, New York University, University Heights, N. Y.

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XX-50	Medium	Nodular	13
XX-55	Fine	Nodluar	16
XX-503	Large	Nodular	10
XX-505	Medium	Nodular	15
XX-601	Medium	Acicular	14
XX-602	Fine	Acicular	20

LEADED

Brand	Relative Particle Size	Particle Shape	Oil Demands
LEHIGH®-6 (35% Leaded)	Med. Large	Nodular	11
LEHIGH-61 (35% Leaded)	Medium	Nodular	14
LEHIGH-112 (12% Leaded)	Medium	Nodular	10
LEHIGH-118 (18% Leaded)	Medium	Nodular	9
LEHIGH-250 (50% Leaded)	Medium	Nodular	12
LEHIGH-635 (35% Leaded)	Medium	Acicular	13

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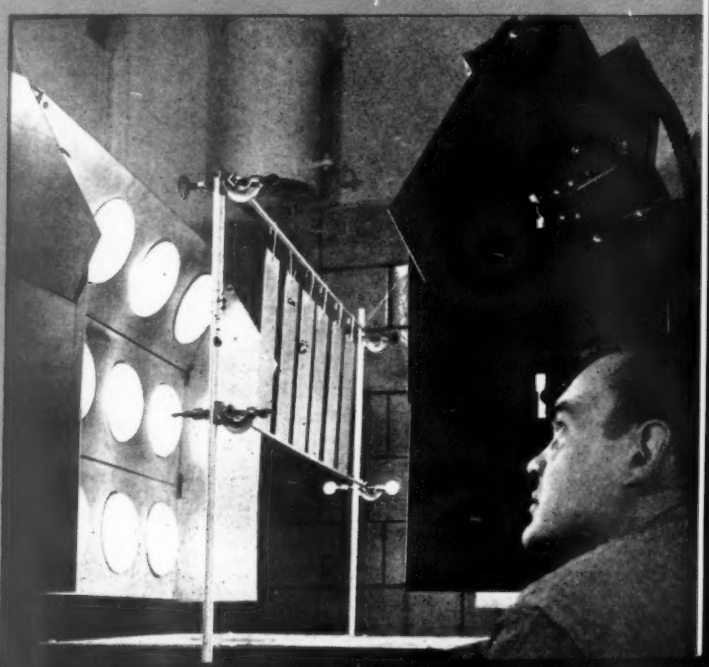
foreign developments

German Testing Devices

Soviet, Polish and Czech Abstracts

Test panels are being prepared for film evaluation of mechanical properties. For a discussion of German developed instruments designed to measure specific properties of paint films, turn to page 101.



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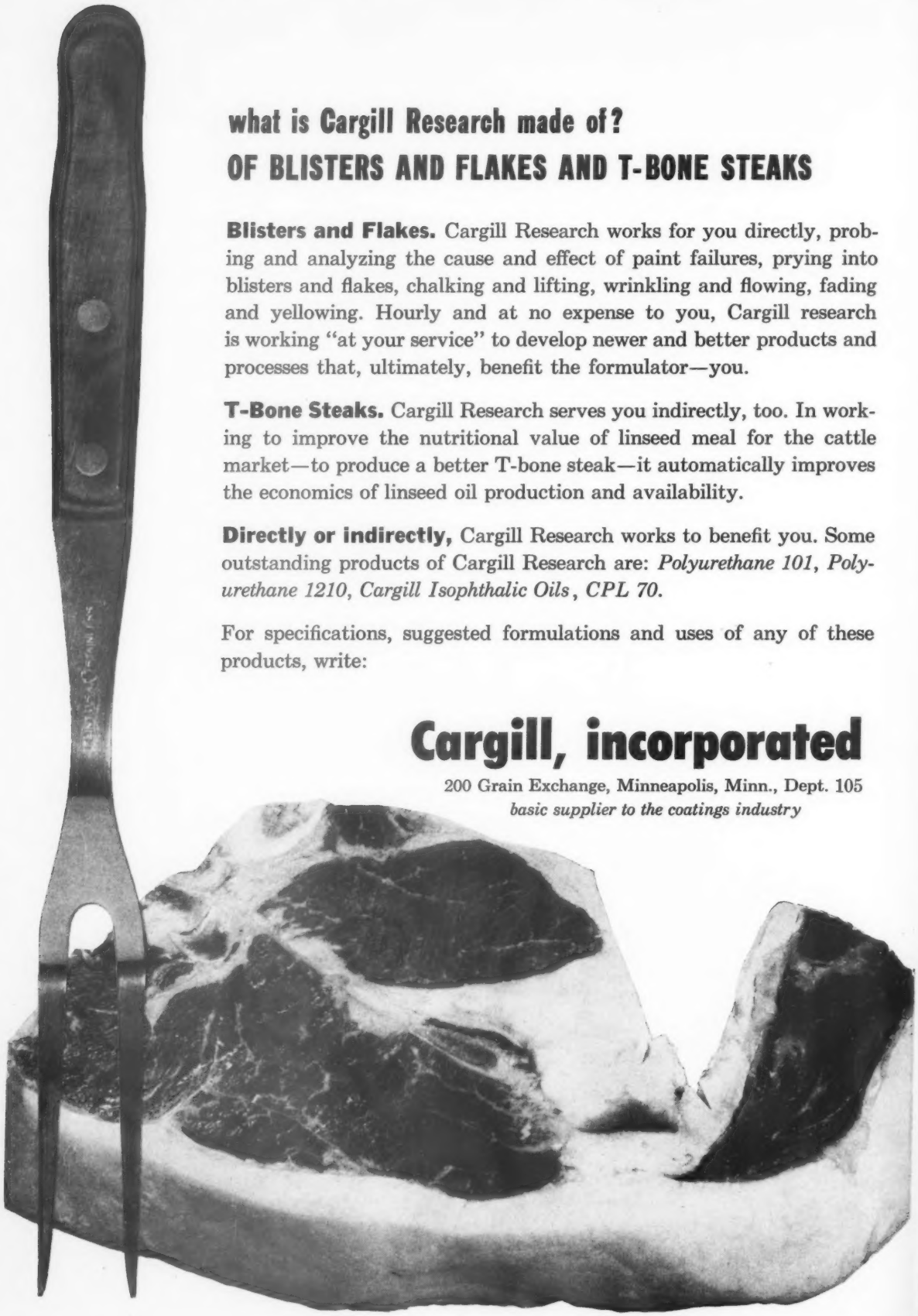


In West Germany

SPECIAL TESTING TECHNIQUES DEVELOPED for PAINTS and LACQUERS

Since 1910, the A. M. Erichsen Company, Ltd., of Hemer-Sundwig, Germany has made available to the coatings industry several interesting new instruments for testing lacquers, paints, and enamels. Most of these instruments are designed to measure specific properties of paint films when such films have special end-use requirements. Here are some of the important testing devices used extensively in Europe.

The Cupping Test, an invention of Mr. A. M. Erichsen who died in 1951, is today after some 30 years of use, accepted as a standard method in Germany and in France (Fig. 1). The method involves applying the tested coating according to instructions on a cupping tinplate which is then deformed by pushing the ball stamper (3) of the testing apparatus against the cupping matrix (1). The coating is thus subjected to increasing tension and bending, to a point when the first cracks appear. The distance travelled by the stamper and measured to a precision of 0.1 mm is called the Erichsen cupping (Fig. 2). It is employed as a measure of the extensibility of the coating, and to estimate its adhesion. The crack formation in the cupping test is observed either optically by eye or microscope (Fig. 3), or electrically through the objective and exact Erichsen Electro-Test (Fig. 4) described below.

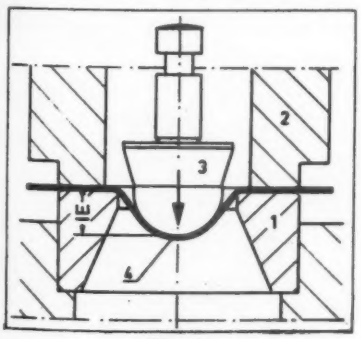


Fig. 1

The Electro-Test determines objectively, ie. independently of the subjective observation of the investigator, the moment crack formation occurs in the cupping test (that is, the extensibility limit of the coating). As shown in Fig. 7, an electrical-conducting fluid and an AC circuit with a resistance measuring device are applied to the deformed coating film. This test also determines whether a coating is porous or not. In such cases, without the tinplate being deformed, the indicator shows a deviation whose magnitude is indicative of the degree of porosity. During the cupping of non-porous films, the smallest deviation of the indicator announces the moment a crack appears. The Cupping Value read from the indicator at that instant indicates the extensibility limit of the tested film, particularly in regard to its corrosion-inhibiting properties. Further deformation of the coating beyond the cupping value increases the formation of cracks; the increase being objectively recorded by the indicator. By charting the electrical deviation increase against appropriate cupping values on a sheet using a system of coordinates, a curve is obtained which represents unambiguously the technological properties, particularly porosity, extensibility and adhesion, of the tested coating film.

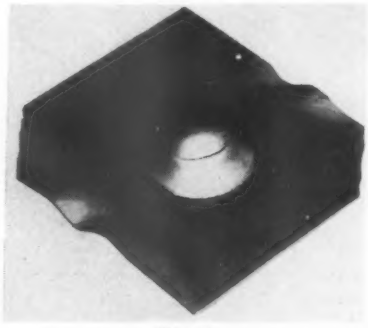


Fig. 2

The Stamping-Lacquer Test, practically unknown in the United States, determines the pressing, stamping and drawing properties of stamping lacquers applied to tinplate. This method, using testing conditions similar to those in practice, provides more information on the quality of stamping lacquers than the cupping test. The stamping-lacquer test (Fig. 5) uses a cylindrically extruded stamper of 33 mm in diameter to deform a lacquers tinplate (64 mm in diam.) to a standard cup with or without bottom ream (Fig. 6), on which the

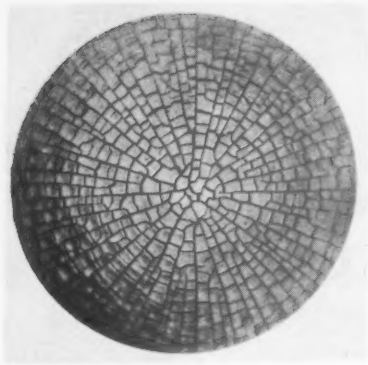


Fig. 3

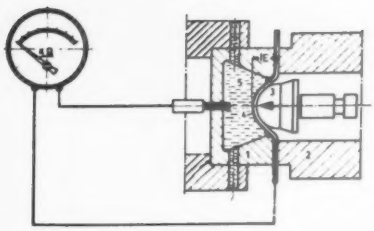


Fig. 4

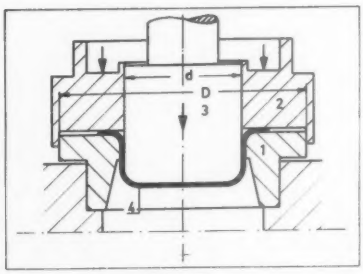


Fig. 5

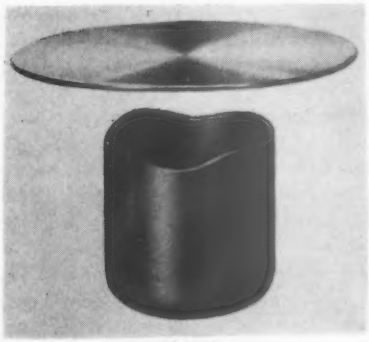


Fig. 6

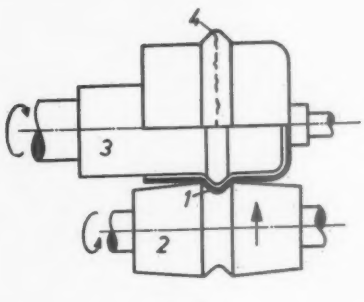


Fig. 7

quality of the stamping lacquer may be determined either visually or microscopically. In special cases, rectangular cups may be drawn for evaluating the lacquer.

The Seam Test was developed especially because of the lack of quantitative methods for numerically determining the stamping lacquer characteristics, (Fig. 7). As is well known, stamping lacquer breaks or cracks most easily on seam edges, as with shoe-polish or floor wax cans, where greatest deformation takes place. In practice such seams are rolled up into the can wall, which is also done with the Seam Test apparatus on standard cups of the stamping lacquer test having a definite lacquer deformation. The seam is drawn to the limit of deformation. The depth of the wall seam, at which the stamping lacquer shows first cracks at the seam edge, is taken as the measure of the seam cupping. Crack formation is observed by means of a microscope, and the seam depth may be read off a scale with precision to 0.02 mm.

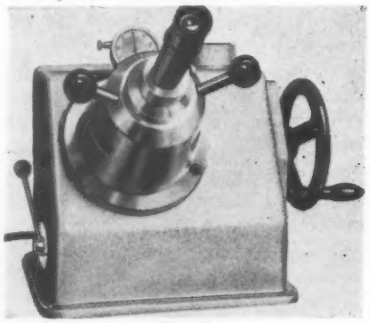


Fig. 8

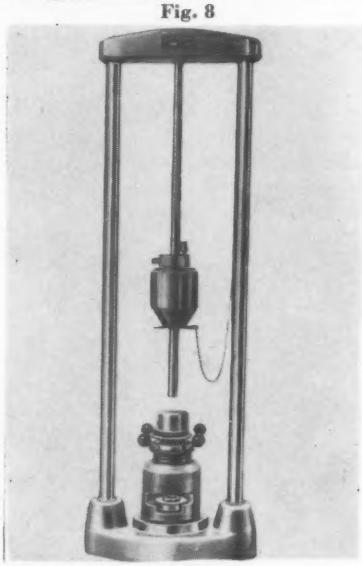


Fig. 9

Fig. 10

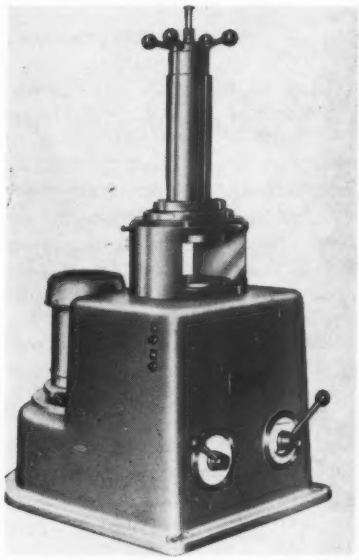


Fig. 11

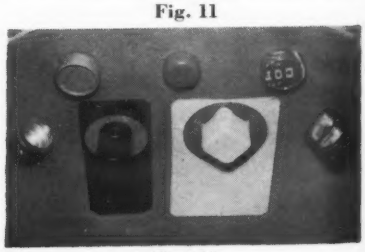


Fig. 12

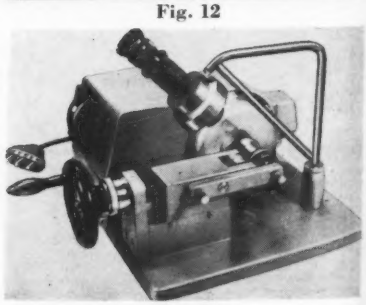


Fig. 13

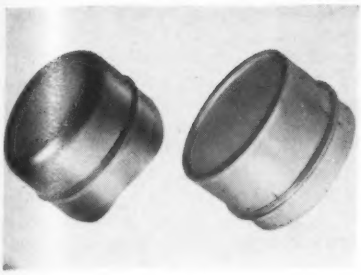


Fig. 14

The following is a description of some of the newer Erichsen lacquer and paint testing equipment employed in the above procedures.

Lacquer and Paint Testing Machine. An instrument with hand-hydraulic drive used for the cupping test. The determinations are observed by eye or with an illuminated microscope (Fig. 8).

Impact Cupping Testing Machine. This instrument exposes coating films to impact-type stresses. The Ball-Test device, is again made use of, and in addition, the Electro-Test may be employed for objective determination of test data. (Fig. 9).

Universal Lacquer and Paint Testing Machine. This device quickly and exactly determines the expansibility, adhesion and porosity of coating films and enamels of all kinds, including accelerated or naturally aged samples. (Fig. 10).

This model carries out the following tests:

a) Cupping Tests according to German and French specifications.
b) Electro-Tests.
c) Stamping Test.

The Stamping-Lacquer Testing Machine—This instrument (Fig. 11) in one step, stamps out and quickly draws a cylindrical or rectangular standard cup. The cupping pressure employed is gradually adjustable through a hydraulic system, most accurate in the range 0-500 kg. The standard cup may, if desired, be drawn with a sharp bottom seam. The canning industry prefers four-edged standard cups. Figure 12 shows the selection of the lacquer samples.

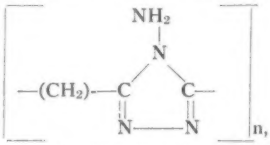
Stamping Lacquer Seam Testing Machine—This instrument (Fig. 13) numerically evaluates the quality of stamping lacquers, by rolling a wall seam into a standard cup of 33 mm called seam cupping (Fig. 14).

SOVIET, POLISH and CZECH ABSTRACTS

Synthesis of Poly-4-Amino-1,2,4-Triazoles

By Korshak, V. V., Chelnokova, G. N., and Shkolina, M. A. Izvestiya Akademii Nauk SSSR, Otdelenie Khmicheskikh Nauk, 5:925-926 (May 1959).

A study of the properties of high-molecular compounds formed by condensation of hydrazine with the following dicarbonic acids (in ratios of two moles or more to one mole): eicosandicarbonic, sebacic, azelaic, adipic, glutaric, succinic and thiodivaleric. The products have the formula where



x=2, 3, 4, 7, 8, 20. These polyaminotriazoles do not decompose when boiled with conc. HCl or with alkali; the latter treatment has a purifying action. The melting temperature is higher for polyaminotriazoles prepared from acids with a high number of C atoms than those from acids having a low number of C atoms. With the exception of the polymer prepared from hydrazine and succinic acid, the solubility of these products in water, ethanol and a methanol-chloroform mixture increases with the decreasing number of methylene groups in the polyaminotriazole ring. All these substances are well soluble in polyatomic alcohols. The tensile strength of films, prepared from polyoctamethyleneaminotriazole (m. p. 255-260°C) is approx. 850 kg/cm². The mechanism of polyaminotriazoles formation is discussed by authors in same journal, 5:929-931 (May 1959).

A New Method of Protecting Steel Pipes in Ships from Corrosion

By Turchin, P. Morskoi Flot, vol. 19, 5:28-29 (May 1959).

Because of corrosion, zinc-coated pipes usually must be replaced after 1.5-2 years. Recent experimental laboratory and practice tests have shown that Zn-coated steel pipes and lead pipes may be advantageously replaced with steel pipes coated with bakelite lacquer, whose corrosion-inhibiting properties are superior. The author also stresses the economic effect of the application of the latter. The treatment steps are described: for chemical cleaning of the pipes, one of the following solutions is used: trisodium phosphate (100-125 g/l), liquid glass (20-25 g/l) at 70-80°C.; or, trisodium phosphate (50 g/l), calcinated soda (50 g/l), and liquid glass (5-10 g/l). The pipes are then washed 3-4 times in water at 70-80°C., and etched in HCl solution (150 g/l, calculated to 100% acid) at 18-20°C., which is followed by washing in cold stream of water and neutralization for 1-2 min. in 10% aq. solution of calcinated soda at 40-60°C. Subsequent to passage through hot air, the material is phosphatized in a solution at 96-99°C. for 15-25 min., washed in water, dried, and coated with two coats of bakelite lacquer (drying time for second coat= 12-15 hours). The procedure ends with heat treatment in closed furnace at 120-130°C. (In Russian.)

Elementary Reactions of Emulsion Polymerization

By Khomikovskii, P. M. Uspekhy Khimii, Vol. 28, 5:547-575 (May 1959).

A comprehensive review article, referring to 137 literature citations from both Soviet and Western publications of the last 8 years. The major part of the review is devoted to latex polymerization, particularly to: colloidal solubility of monomers and initiators in soap solutions; colloidal phenomena in latex polymerization processes; and elementary reactions in latex polymerization. A shorter discussion is devoted to drop polymerization. The review also broaches some of the problems to be dealt with in immediate future.

Industrial Application Study of Lacquer MCh-52.

By Sverdlov, S. I. Derevoobrabatyvaiushchaya Promyshlennost', vol. 8, 4:20-21 (April 1959).

Lacquers No. 754 and NC-312, which find widest application in the Soviet furniture industry, have a dry-residue content of 17 and 22 percent, respectively; for satisfactory application, at least 4-5 coats are necessary. A new lacquer, MCh-52, has been prepared by GIPI in 1958, which contains 45-48% of film-forming substances. This lacquer consists of a base (solution of glyphthalic urea-formaldehyde resin in organic solvents), solidifier (3.5-4% solution of HCl in butanol), and diluent (a mixture of xylene and butanol). The lacquer applies evenly, and the film has a satisfactory color; after polishing, its gloss is also good. A minimum of 3-4 coats are necessary for a high-quality finish. The disadvantages of the lacquer are cited: the solvents remain active only four hours; free butanol and formali[n] contents in lacquer are high, and they separate during application and drying; the drying time is 1.5 hours at 20-22°C. The high water- and heat resistance of the lacquer renders it suitable for dinner-table finishing. Another field of application is foreseen in the skiing industry: the stability of MCh-52 lacquer to freezing temperatures equals that of the better non-Soviet ski lacquers. (In Russian(.

Wash Primers

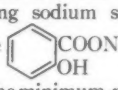
By Jedlinski, Z., and Nowak, J. Przemysl Chemiczny, vol. 38, 3:176-180 (March 1959)

A study of the influence of pigment grade and of the phosphoric acid content upon the anti-corrosion properties of wash primers based on polyvinyl butyral resins, and on zinc and lead chromates. The importance of the relationship between wash primer pH and its anti-corrosive characteristics has been determined: the corrosion-inhibiting properties of those paints, which show an insignificant increase of two components, were poor. The change in pH value depends considerably on the pigment grade, and on the amounts of phosphoric acid and water added. The best pigments appear

to be basic zinc chromates, especially $ZnCrO_4.Zn(OH)_2$. Measurement of the redox potential, following the mixing of wash primer components, permits to determine the period in which the paint shows increased passivating properties. The optimum content of phosphoric acid in wash primers was found to be 3-4%. In painting with anti-corrosion paints, the application of reactive grounding paints considerably extends the protection period for painted objects. Wash primers protect steel products, stored on free air, for several weeks. (In Polish.)

Sodium Salicylate as Corrosion Inhibitor for Steel in Neutral Media

By Bogatyreva, E. V., and Balezin, S. A. Zhurnal Prikladnoi Khimii, vol. 32, 5:1071-1076 (May 1959).

As a result of introducing the hydroxyl group into the benzene ring, the steel-corrosion inhibiting properties of salts of benzoic acid are lowered. The authors, using sodium salicylate (hydroxyl in the  position), determined the minimum-protection concentrations of Na-salicylate and Na-benzoate for steels 10, 20, and U-8 in both distilled and common water: while sodium salicylate inhibits corrosion of steel in both types of water, its minimum-protection concentration is higher than that of Na-benzoate. For sodium salicylate, the optimum corrosion-inhibiting temperature are in the range 20-60°C, for sodium benzoate between 20-100°C. Chloride, sulphate and nitrate anions lower the corrosion-protective capacity of sodium salicylate. Minimum protection concentrations of sodium salicylate and benzoate in 0.1, 0.01 and 0.001 mol. concentrations of NaCl, Na_2SO_4 and $NaNO_3$ are tabulated for Steel 10. Aeration in solutions plays a double role: while it lowers the minimum-protection concentration of these inhibitors for steel in water, it induces corrosion at unsufficient concentrations for steel in distilled water. The corrosion-inhibiting pH interval is 6-13 for Na-salicylate, 5.5-13 for sodium benzoate. The presence of oxygen is a necessary condition for the corrosion-preventing action of Na-salicylate on steel in distilled water.

Epoxy Resins Based on Diphenylolethane and Phenol Acetaldehyde Resins

By Iukhnovskii, G. L., and Khva-den, Zu. Zhurnal Prikladnoi Khimii, vol. 32, 5:100-1105 (May 1959).

The authors studied the possibility of using diphenylolethane (4,4'-dioxydiphenylmethylmethane) and phenolacetaldehyde resins as polyatomic phenol instead of diphenylolpropane. It was shown that in the reaction of phenol and acetaldehyde (molar ratio 4:1), diphenylolethane (DPE) is not the sole product; phenolacetaldehyde resins are formed parallell with it. DPE was separated from these resins in pure state by extraction with benzene and subsequent crystallization; quantitative separation of DPE was carried out from phenolacetaldehyde resins prepared from phenol and acetaldehyde at the following molar ratios: 4:1, 3.5:1, 3:1, 2.5:1, 2:1, 1.75:1. Lowering of molar content of phenol leads to sharp decrease in the DPE content in the resin. Polyfunctional homologs of DPE are taken to be the reason of the formation of three-dimensional polymers in the synthesis of epoxy resins from domestic DPE; pure DPE, taken with epichlorohydrin at varying molar ratios, does not form three-dimensional polymers. It is shown that the domestic product, released as DPE (phenol 77.7 percent, paraldehyde 21.85 percent, HCl 0.45 percent), is actually a phenolacetaldehyde resin; using the current manufacture technology, it can contain only small amounts of DPE. The preparation of epoxies from pure DPE and epichlorohydrin is described.

Determination of Particle Number and Size in Synthetic Latexes

Hlousek. Chemicky Prum ysl, 9(34), 5:265-269 (May 1959).

A simplified transmission method for the determination of particle sizes in the range of 200-2200 A, based on the photometric determination of optical densities of diluted latex samples. The ways of calculating theoretical values are given; the latter agree with experimental results obtained by the new method. (In Czech.)

Copolymerization of Methylmethacrylate with Triallylmethylsilane and Tetraallylsilane

By Mikulasova, D., Pavlinec, J., Simek, I., and Hrivik, A. Chemicke Zvesti, vol. 13, 4:228-233 (April 1959).

Using dibenzoylperoxide as initiator, the authors copolymerized methylmethacrylate with 1-10% triallylmethylsilane, and with tetrallylsilane. Within the conversion degrees studied (10-15%), the resulting polymer was still totally dissolved. The authors were unable to explain the inhibitory effect of allylsilanes on the polymerization of methylmethacrylate; the partially retarding effect of allylsilanes on the polymerization has led them to conclude that a reaction between methylmethacrylate and allylsilane takes place even in the stadium in which no solid polymer is formed. (In Slovak.)

Physical Properties of Phenolic Novolaks

By Bohdanecky, M., and Tamtycha, J. Chemicky Prumysl, 9(34), 4:221-223 (April 1959).

The dependence on molecular weight of softening points, specific and molar volumes, and of the volume dilatation coefficient of novolaks, prepared from phenols and *p*-tert-butylphenol, corresponds to equivalent terms for linear polymers. Apparently, the studied novolaks behave as polymer homologs. (In Czech.)

On the History of Ultramarine

By J. Flek. Chemicky Prumysl, 9(34), 198-200 (April 1959).

Some data on the development of ultramarine production in Central Europe since about 1850. (In Czech)

Furfuryl Alcohol Resins

By J. Mleziva and E. Lavicka. Chemicky Prumysl, 9(34), 5:276-277 (May 1959).

A review article (35 literature references to mostly American sources). The development in Czechoslovakia of "Furol 75" lacquer is mentioned; the lacquer, whose properties will be described in a later paper, has been successfully employed as an anti-corrosive coating. (In Czech.)

Adhesive Properties of "Vinilfleks" Lacquer

By Kletchenkov, I. I. Vestnik Elektropromyshlennosti, 8:10-12 (1958).

The author proposesa novel method of determining paint and lacquer adhesion by recording the measurements with the aid of an electro-mechanical adhesion meter, consisting of a generator, oscillatory circuit, and a voltmeter. The adhesion characteristics of the "Vinilfleks" lacquer (VL-7), as determined by this method, are: adhesion increases with increase of both the temperature and time of drying; at constant drying time, sharp increase in adhesion (up to 20 mm/g) occurs at temperature ranges 120-140°C (solvent boiling temperature); adhesion decreases to 35-45 percent after 20 hours of submersion sample in water; multi-coat application (i.e., film thickness) also increases the adhesion of the lacquer.

A Simple Instrument for Measuring the Thickness of Non-Magnetic Coatings for Steel

By Azarov, K. P., Gorbatenko, V. E., and Krolikov, V. N. Zavodskaya Laboratoriya, vol. 25, 4:486 (April 1959).

A magnet-housing pocket instrument, constructed along the lines suggested in the *Bulletin of the Amer. Ceramic Society*, vol. 33, 10:14 (1954), claims wide application for measuring the thickness of lacquer, enamel and other non-forromagnetic coatings applied to magnetic surfaces. It is designed on the principle of the change in attraction force of the permanent magnet to the surface, which depends on the thickness of the non-magnetic coating. (In Russian.)

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Correction

In our September issue under Foreign Developments, we published an article (page 89) entitled, "The Paint Industry in Denmark." We wish to acknowledge that the photographs appearing on pages 90 and 92 of this article were taken at the Sadolin & Homblad A/C factory in Copenhagen. Also the author of this article is H. K. Raaschou Nielsen, director of Research, Central Research Laboratory of the Danish Paint and Varnish Industry.

NEWS

NEWS OF COMPANIES, ASSOCIATIONS
TECHNICAL GROUPS
ITEMS OF GENERAL INTEREST

Construction Begins on New Anhydride Plant

Construction will be started immediately on a semi-commercial plant to produce multi-million pound quantities of trimellitic anhydride, George A. Harrington, general manager of development of Amoco Chemicals Corporation, announced today. "This is the first stage in Amoco's plans for full scale commercialization of trimellitic anhydride," he explained.

"Amoco Chemicals first introduced trimellitic anhydride in development quantities less than a year ago. Its rapid progress from development toward commercialization is a tribute to the unique advantages this chemical offers to protective coatings, plastics, and adhesive manufacturers," Harrington stated. "The unusual reactivity offered by the presence of both an anhydride and a free acid group in the chemical structure enables the chemist to make products which cannot be duplicated with currently available materials.

"The multi-million pound unit which will be built at a company-owned site south of Joliet, Illinois is expected to be on stream by mid-1960," Dr. Harrington said. "This new unit will enable us to supply our customers' requirements of trimellitic anhydride which is currently being allocated."

Dr. Harrington pointed out that the protective coatings industry has been particularly enthusiastic about the water soluble baking finishes derived from trimellitic anhydride. These finishes have outstanding film properties and produce excellent quality finishes with high gloss without the use of organic solvents. Such systems have been a goal of this industry for many years.

"Another promising application for trimellitic anhydride is its use as a curing agent for epoxy resins," Dr. Harrington continued. "It is also a chemical intermediate and a raw material for the production of long-oil alkyd resins, unsaturated polyesters, and thermosetting adhesives.

New Radioisotope Lab

A radioisotope laboratory, equipped and staffed for basic research and industrial applications of radioisotopes, has been installed by Evans Research and Development Corp. Its major activities will be in the areas of radiochemistry and nuclear instrumentation. In making this announcement, Dr. Eric J. Hewitt, Vice-President of this independent laboratory, stated that the radiochemist and an integrated team of research specialists hold the key to many of the unsolved problems in industry. He indicated that for the ten year period ending in 1965, this modern "atomic" tool will save industry an estimated five billion dollars.

According to Dr. Jane Connor, head of Evans Research radiochemical laboratory, the unequaled sensitivity and specificity of radioisotopes provide the chemist with the most powerful analytical tool ever developed for studying complex and biological processes. Its radiation can be traced or measured in minute quantities—a millionth to a hundred-millionth of the amount detectable by other means. The increased availability, low cost and the safety level of radioisotopes now offer science and industry infinite applications.

Zettlemoyer Named to Board of Directors

Dr. Albert C. Zettlemoyer, professor of chemistry at Lehigh University, has been elected to the board of trustees of the Gordon conferences, a series of 36 scientific meetings held annually.

The conferences which have received grants from the Rockefeller Foundation and the National Science Foundation attract more than 4,000 scientists each year. The meetings are held at Colby Junior College, New London, N. H.; New Hampton School, New Hampton, N. H.; and Kimball Union Academy, Meriden, N. H.

Dr. Zettlemoyer, who directs the National Printing Ink Research Institute program at Lehigh University, served as one of 12 university representatives on the Gordon Conferences Council for six years. He was chairman of the Conference on Chemistry in 1955.

A native of Allentown, he was graduated from Lehigh in 1936, received his master of science degree from Lehigh in 1938 and his doctorate from Massachusettss Institute of Technology in 1940.

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New Representative

The Oilseeds Div. of General Mills has appointed T. F. McAdam, Inc., 103 Cornelia Street, Boonton, N. J., as sales representative for General Mills' technical grades of soybean and safflower oils in the New York City area.

Benjamin Chatzinoff (left) was installed as the president of the N. Y. Paint & Varnish Production Club for the coming season. Other new officers are: Anthony Skett, Vice-Pres.; John J. Oates, Sec.; Raymond L. Whitney, Treas.; and Dr. Leroy Soff, W. E. Santoro and E. Judson Cole members, Exec. Committee. Moe Bauman, (right) retiring president, was presented with a gift from the club as a token of appreciation for a job well done.

NEWS

New Warehousing Agent

Smith Chemical & Color Co., Inc., 55 John St., Brooklyn 1, N.Y., announces its appointment by Carey-Canadian Mines, Ltd. of Quebec, Canada as warehousing agent for its extensive line of asbestos fibre and shorts.

Carey-Canadian Mines, Ltd. is one of the largest suppliers in the industry and it maintains a most exacting quality control program. Standardized grading and rigid control of fibre processing guarantee a source of fibre that remains uniform, year after year.

New Reichhold Plant

Reichhold Chemicals, Inc., is in the process of building a plant for the production of phenolic molding compounds. Production and laboratory facilities for phenolic molding compounds are already available through the company's recent acquisition of the Varcum Chemical Corp. and its Canadian subsidiary, which have been producing phenolic molding compounds for many years.

New Distributor

Appointment of Harry A. Baumstark & Co., St. Louis, Mo., as distributor for Marbon 9200 and 1100 TMV paint resins has been announced. The Baumstark organization will represent Marbon in eastern Missouri and southern Illinois.

American Tung Oil Assn. Elect Rosborough Pres.

Otis Rosborough Jr., manager of the Compass Lake Growers Assn., Mariana, Fla., was elected president of the American Tung Oil Association by the ATO board of directors meeting at the Edgewater Gulf Hotel. He succeeds Marshall Ballard Jr., who has served as president of the association for the last eight years.

Vice presidents elected were: C. W. Goodyear Jr., Bogalusa, La.; J. Riley Rankin, Poplarville, Miss.; and W. F. Warren, Lumberton, Miss.

Robert M. Newton of Wiggins, Mississippi was re-elected president of the Pan American Tung Research and Development League. Mr. Newton has served as president of the Pan American League since its formation in December 1958.

The convention is a combined meeting of the ATOA, the National Tung Oil Marketing Cooperative, the (U. S.) Tung Research and Development League, and the Pan American Tung Research and Development League. Some 200 delegates from 20 states attended the convention.

Dr. J. Scott Long, executive director of the Paint Research Institute, who has been associated with the field of paint technology for 45 years, told the group the Tung Industry must substantially increase research if it is to hold present markets for tung oil in the coatings industry and regain markets lost during recent years.

Stressing the need for at least 2 percent of the sales dollar going into research, Dr. Long said, "It will take considerable plain old fashioned hard work under good guidance to bring your position up to that of the competing materials which have plowed back a reasonable percentage of their profits for research over a period of years."

"Like many other industries," he continued, "you have been guilty of neglecting the truly scientific approach—you need to establish some of the fundamentals that should have been accumulating during the past ten years. Tung is a unique, interesting, exciting raw material," he said.

NEWS

PAINT ROLLER: By using an industrial type roller, one man can effectively cover 500 square feet of corrugated steel roof with Metallic Zinc Paint (MZP) in an hour, recent Alabama Polytechnic Institute demonstrations have shown. This is five times as fast as a man can apply paint with a brush, adding time and labor savings to the excellent corrosion protection supplied galvanized or uncoated steel by MZP.

Millmaster Moves Offices

On September 1st, Millmaster Chemical Corp. and Millmaster International, Inc., distributors of industrial and agricultural chemicals, pharmaceuticals, intermediates and fine chemicals, moved its executive offices. The new address is 99 Park Avenue, New York 16, phone MU 7-2757. The former New York address was 295 Madison Avenue.

Millmaster is the exclusive sales agent for Berkeley Chemical Corporation, Berkeley Heights, New Jersey, and F. O. Cockerille, Greenwood, Virginia, and Eastern sales agent for Arapahoe Chemicals, Inc., Boulder, Colorado, and the S. W. Shattuck Chemical Company, Denver, Colorado. In addition, Millmaster sells both on an exclusive and non-exclusive basis the products of many of the chemical industries' largest manufacturers.

New Distributor

John K. Bice Co. has been named by J. M. Huber Corp. as exclusive distributor for its new series of "Huber" kaolin clay extenders and Zeolex synthetic silicate pigments to the paint, varnish, printing ink, plastics and specialty processing industries in Southern California, Arizona, New Mexico, Utah, Colorado and Wyoming.

Originally primarily a supplier of general raw materials and additives for the paint industry, the company has since been supplying raw materials to allied industries—especially extender pigments. Warehouse stocks of all items are available at one location.

Opens Sales Office

Polyvinyl Chemicals, Inc. has announced the opening of New York sales offices at 274 Madison Avenue. Mr. Joseph E. Conklin has been appointed manager of the office which will serve the greater New York area.

Distributor Named

Pacific Coast Chemicals Company has been named by J. M. Huber Corporation as exclusive distributor for its kaolin clay extenders and Zeolex synthetic silicate pigments to the paint, varnish, printing ink, plastics and specialty processing industries in northern California.

NEWS

Withington Named Distributor

C. Withington Co., Inc. has been named by J. M. Huber Corp., as exclusive distributor for its new series of "Huber" kaolin clay extenders and Zeolex synthetic silicate pigments to the paint, varnish, printing ink, plastics and specialty processing industries in Metropolitan New York and the state of Florida.

New Distributor

Southern Clays, Inc. announces the appointment of F. H. Ross and Co. as its exclusive distributor for the paint, adhesives and specialty industries. F. H. Ross and Co. will handle the six southeastern states from sale offices and warehouses located at Atlanta, Birmingham, Charlotte, Columbus, Greensboro, Greenville, Jacksonville, Miami and Mobile.

NEW LABORATORY: New facilities for Hodag Chemical Corp. will be used for product development and application studies on Chicago firm's line of antifoams, esters, emulsifiers, flocculating agents.

Carbide Award Winners

Frank A. Bovey, George V. D. Tiers and George Filipovich of Minnesota Mining & Manufacturing Co.'s central research department have been given the annual Carbide Award of the American Chemical Society's Paint, Plastics and Printing Ink division.

The award is based upon a paper entitled, "The Application of Nuclear Magnetic Resonance to the Study of the Motion and Conformation of Polymer Chains in Solution." The winning paper is selected from those presented at the A.C.S. division's two meetings each year. The award includes a $300 cash prize to the authors of the winning paper.

NEWS

LIKE A SPIDER on a web, a steelworker inches along a narrow beam, 60 feet above the ground, unhooking a hoist cable which lifted the two-ton rafter into place. The scene occurred during construction of a million-bushel storage tank at Cargill, Incorporated processing plant at Savage, Minn. The bin, erected by Minneapolis Tank and Manufacturing Co., will be completed in time to receive the 1959 bean crop, Cargill officials report.

Halogenation Review Offered

Bound volumes of reprints of Dr. Earl T. McBee's *Annual Review of Halogenation* covering the past ten years have been published by the Columbia-Southern Chemical Corp. for distribution to scientists in the academic and industrial fields.

Copies of these bound reprints can be obtained by writing to the Columbia-Southern Chemical Corp., One Gateway Center, Room 2089, Pittsburgh 22, Pa.

Dr. McBee is head of the chemistry department at Purdue University and since 1948 has authored his famous reviews on halogenated compounds. Based on the four halogens—fluorine, chlorine, bromine and iodine—the halogenated organic compounds have made possible an increasing number of new products—drugs, dyes, insecticides, fuels, plastics, fibers and metals—all of which have contributed toward better health, greater comfort and more convenience of mankind.

Albert C. Munn Retires

Retirement of Albert C. Munn, veteran salesman for Diamond Alkali Co. brings to a close nearly two decades of service to the company.

Mr. Munn started with the firm in January 1940 as a sales serviceman in the New Jersey area. In 1944 he became a laundry technician in the New York area, counseling customers on the application of laundry products. Since 1950, he has concentrated on sales-service work to customers in the New York area.

A World War I veteran, Munn attended Newark Technical High School, Newark, New Jersey from 1920 to 1923 before starting his lengthy sales career.

Glidden Acquires Ore

A large deposit of high grade ilmenite ore, located in Ocean County, N. J., has been acquired by the Glidden Co.

Ilmenite ore is the principal raw material used in making titanium dioxide, which is the most opaque and versatile of all white pigments and vital to the paint, paper, plastics, rubber and other industries.

Located near the Lakehurst Naval Air Station, the ore tract was acquired from the American Metals Climax Co. The deposit represents a 20-year supply of high grade domestic ore at his division's current level of operations. Additional adjacent acreage, which will extend this supply, is under option.

NEWS

Improved Grinding Yields Better Paints

Paints, inks and other kinds of coatings are being produced faster and better because of improvement of one of man's longest known arts—production of fine particles by grinding, the American Institute of Chemical Engineers was told.

This was reported in a paper, *The Ball Mill for Pigment Dispersion and Grinding*, presented by Ray H. Jebens, manager of application and research, the Patterson Foundry and Machine Company, East Liverpool, Ohio.

"In the past twenty-five years, the usefullness of the ball mill for the purpose of producing paints, inks and various kinds of coatings has improved tremendously," he said. "This change has been brought about by the use of larger ball charges, smaller ball size, higher mill speeds, larger paste volumes, higher pigment concentrations, low vehicle viscosities.

"Products that formerly required as long as 30 to 70 hours can now be ground and dispersed in a matter of 4 to 8 hours. The shorter processing times in many cases produces a superior product with less contamination," he said.

Wet grinding for particle size reduction follows this sequence: selection of highest grinding media permissible from the standpoint of contamination, cost and process; selection of the smallest ball practical, selection of the lowest vehicle viscosity possible, with due consideration for effects of dispersants, flocculants and temperature.

When this procedure is followed, he said, "and mills are operated at about sixty-five percent of critical speed with fifty percent by volume of ball charge and paste charge (eighty percent total) the results will be a fast, economical size reduction or dispersion."

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Foreign Anhydride Plant

Reichhold Chemie A. G., Swiss affiliate of Reichhold Chemicals, Inc., is building a phthalic anhydride plant at Hausen bei Brugg, Switzerland, it was announced.

The new $2.5 million plant, with a production capacity of 10,000 tons annually, will be Reichhold's ninth phthalic anhydride facility and is scheduled to go onstream early in 1960. RCI is currently operating PA plants at Detroit, Mich., and Azusa, Calif., and construction is nearing completion at the firm's third domestic unit at Elizabeth, N. J. The company also produces phthalic anhydride in Australia, Canada, England, France and West Germany.

Phthalic anhydride is used principally in the manufacture of polyester and alkyd resins, and various plasticizers.

Construction of the new phthalic plant is part of an overall three year, $5 million expansion at the Swiss facility, which, in turn, is but one step in RCI's current worldwide expansion program.

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New Anhydride Plant

Pittsburgh Coke & Chemical Co. announced board approval of plans to construct a new 20-million-pounds per year maleic anhydride plant.

Construction will begin shortly at the company's main Neville Island plant where the new facility is scheduled to go on stream early in 1961.

They're both guns, but...

each is in a class by itself . . . like Wyandotte's PURECAL® O

A little bit of water won't do you any harm. But a little bit of lead? That's different! Still, there's no gun you can afford *not* to take seriously.

It's the same way with calcium carbonates. There are important differences . . . and it pays to give them careful consideration. Wyandotte PURECAL O is in a class by itself! Reason: It is precipitated by a special process which consistently yields agglomerate-free particles 0.15 micron in size, that are cubical in shape. Purity and whiteness are *exceptional.*

PURECAL O is a quality builder . . . it acts as a suspending agent for the other pigments, maintains dispersion and increases shelf-life. PURECAL lowers prime pigment requirements for a specified level of quality or can improve quality with a given level of prime pigments used.

The result: PURECAL O can improve the quality of your product at no increase in cost . . . or maintain quality while cutting costs. Try it in *your* process. Write for samples and data, today. *Wyandotte Chemicals Corporation, Dept. 759-P, Wyandotte, Michigan. Offices in principal cities.*

Wyandotte CHEMICALS

MICHIGAN ALKALI DIVISION

PACING PROGRESS WITH CREATIVE CHEMISTRY

PERSONNEL CHANGES

CALIFORNIA INK

C. D. "Bus" Leigh has been named to the newly created position of national account sales manager—raw materials, it has been announced. He has been manager, product sales—raw materials since 1953.

C. D. Leigh

Mr. Leigh has been one of the men most instrumental in the sales development of tube systems for the paint industry. In 1948, his firm's "one-shot color system" gained rapid acceptance in the west. In 1953, when the firm's laboratories developed Universal Tubed Colorants, he directed the sales program through agents in key locations east of the Rockies and achieved distribution throughout the country.

CONTINENTAL CAN

L. G. Cannella has been appointed products sales manager of non-food cans, it has been announced. He is succeeded in his former position as district sales manager for metal containers in New York City by **T. V. Carley,** who previously held the comparable position in Boston.

L. G. Cannella

Mr. Cannella's non-food can line includes containers for paints, chemicals, motor oil, anti-freeze, liquid detergents, waxes and all aerosol products.

U.S.I.

Edward C. Richardson has been appointed Chicago division sales manager, it has been announced. Mr. Richardson replaces the former Chicago sales manager, **George H. Stanton,** who is now the company's director of field sales.

Mr. Richardson, who holds a Bachelor of Chemistry degree from Cornell University, has been with the firm since 1940 and was Boston division sales manager for the company from 1950 until the time of his new appointment.

DIAMOND ALKALI

J. H. Perkins, Jr. has been promoted to project engineer, research department, it has been announced.

His new post includes full time supervision of personnel and equipment in the high pressure laboratory at the research department.

MINNESOTA MINING

Dr. B. F. Landrum has been appointed polymer section head central research department, it has been announced.

Mr. Landrum joined the company in 1957 as supervisor in the fluorochemical section and later served as synthesis research supervisor for the firm's advanced research project agency research contract involving higher energy solid rocket fuels.

JEFFERSON

Peter S. Vail has been appointed to the sales staff it has been announced. The appointment is effective immediately and Mr. Vail will be assigned to the company's regional sales office in Chicago.

Mr. Vail, a native of Cincinnati, Ohio, is a graduate of Lehigh University, Bethlehem, Pa., with a B. S. in Chemical Engineering.

AMOCO

Robert E. Elliott and **William A. Hubbard** have been appointed Manager—Industrial Chemical Services, Manager—Industrial Chemicals Sales, respectively, it has been announced.

R. E. Elliot

W. A. Hubbard

Since joining the firm in 1957, Mr. Hubbard has been supervisor of the product technology group and, most recently, assistant to the general sales manager. Previously he had served as president of Copolymer Chemicals, Inc., Livonia, Mich., and as a salesman and technologist with Shell Chemical Co., in New York. He holds an M. B. A. degree from Harvard Graduate School of Business Administration and a B.S. degree from Missouri School of Mines. He is a member of the Chicago Paint and Varnish Production Club and the Harvard Business School Association of Chicago.

For 10 years prior to the formation of Amoco Chemicals Corporation, R. E. Elliott was a salesman for Indoil Chemical Co., one of its predecessor companies. He joined his present firm at the time of its formation 2½ years ago and was made Chicago district manager a year later. He holds a B. Ch. E. degree from Ohio State University.

GENERAL MILLS

David Brodess has been named to the staff of the Chemical Division, it has been announced.

Mr. Brodess has been assigned as a trainee in the division's technical service department.

He is a 1959 graduate with a B. S. in chemical engineering from Tri-State College in Angola, Indiana, and also attended Miami University in Ohio.

UNION CARBIDE CHEMICALS

New assignments for five men in the sales department have been announced.

They are: **Dale F. Swartz,** from Buffalo district manager to St. Louis district manager; **Robert W. Lindberg** from Cleveland assistant district manager to Buffalo district manager; **Albert H. Welle** from technical representative in the Boston district to Newark assistant district manager; **John W. Fleck** from technical representative to Cleveland assistant district manager; and **Paul G. Horecka** from technical representative to New York assistant district manager.

ARIZONA CHEMICAL

Henry W. Bajak has been named assistant to the president it has been announced.

Mr. Bajak has been with the company's fine chemicals division since 1952 and he has served in a variety of sales and administrative posts.

In his new position, he will be responsible for coordinating market planning, research and new product development. He will also serve as a general administrative assistant to the president.

STRESEN-REUTER

J. John Richmond has been appointed the southern Ohio representative, it has been announced.

Mr. Richmond will represent the complete line of products to both Paint and Printing Ink industries in Cincinnati and Southern Ohio, where he has been very active for many years.

COSDEN

Kelley Lawrence, formerly sales representative, has been named manager of solvent sales, it has been announced.

Mr. Lawrence has been with the firm seven years, starting as a billing clerk in the asphalt department. He transferred to the organic chemicals division as clerk and advanced to salesman and later sales representative.

He attended Howard County Junior College and the University of Texas.

EASTMAN CHEMICALS

C. R. Lee has been appointed to the Chemical Division's sales office in Skokie, Ill., it has been announced.

Mr. Lee, who will represent the company in the selling of its industrial and specialty chemicals in the Metropolitan Chicago area, joined the organization as a chemist in the Synthetic Chemicals Department at Kodak Park, Rochester, N. Y., in 1939.

PITTSBURGH COKE

William T. McLaughlin has been promoted to field sales manager for the protective coatings division it has been announced.

In his new position Mr. McLaughlin will be responsible for supervision of the division's nationwide sales. This will include sales of pipeline coatings to the gas and oil industries and a wide range of corrosion-resistant coatings for industrial use in the marine, steel, and chemical processing fields.

Prior to his promotion, Mr. McLaughlin was the protective coatings marketing manager. He joined the firm in 1948 as production manager of its agricultural chemicals division, subsequently served in several marketing capacities, and later became project manager—commercial development.

He was graduated by Pratt Institute of Technology with a degree in industrial engineering, and is a member of the Chemists' Club of New York, the American Marketing Assn., and the American Society of Chemical Engineers.

HERCULES

Jerome D. Towe has been named sales and technical service representative to the protective coatings industry in the Los Angeles area is has been announced.

Mr. Towe will represent both the cellulose products and synthetics departments.

Mr. Towe, a graduate of Lehigh University, joined the firm in 1953 after graduation, and has a background of experience in research as well as the sales and technical service of the company's products for the paint, varnish, and lacquer industries.

AMERICAN ALKYD

Frank J. McLeod has been named mid-western district sales manager it has been announced.

Mr. McLeod will supervise the sales of polyester resins to the boat, perform, premix molders and automotive plastics manufacturers.

He pioneered in developing new markets and manufacturing processes for fiberglass products while a sales manager with Owens Corning Fiberglas Corp During the early years of fiberglass production, Mr. McLeod worked on the adaptation of this basic material to the paper, plastic, textile, metal and ceramic industries.

SHERWIN-WILLIAMS

E. Colin Baldwin has been named vice president and general manager it has been announced.

E. C. Baldwin

In his new post, Mr. Baldwin will continue as president of the company in Canada, Ltd., the position he has held since 1958. He will make his headquarters at the company's international headquarters here.

Mr. Baldwin joined the Cleveland firm in 1934. He served successively in market research, sales promotion, advertising, branch operations and as general manager of the company's stocks and distribution department. In 1946, upon his return from military service, he was named assistant to the president. He left that post in 1956 to become executive vice president of the Canadian operation at Montreal.

GOODYEAR

Robert H. Hoffman has been named sales representative in the New York district it has been announced.

R. H. Hoffman

In his new post, Mr. Hoffman will be concerned primarily with sale of resins to the paint and coatings industries throughout the New York, New Jersey and Pennsylvania areas.

He joins the fim with extensive experience as a technical and sales representative in the chemical industry, handling organic chemicals in territories around Buffalo, N. Y. and Newark, N. J.

He was graduated from LaSalle College in Philadelphia with a B.S. degree in chemistry. He is a member of American Chemical Society and honor society of Alpha Epsilon.

DEWEY & ALMY

Billy E. McCardle been named sales representative for organic chemicals in North and South Carolina and Southern Virginia, it has been announced.

B. E. McCardle

Mr. McCardle was formerly with Southern Sash Sales and Supply Co., Sheffield, Alabama, and has also served with the Flagg Utica Corporation and Avondale Mills. He received a B. S. in chemistry from the University of Alabama in 1951.

SHELL DEVELOPMENT

Dr. **William V. Medlin** of Berkeley will leave the Emeryville (Calif.) research center about the middle of this month to take an assignment as technical assistant to Dr. Harold Gershinowitz, it has been announced.

A supervisor in the oil process engineering department, Dr. Medlin has been with the company since 1935 when he joined the Wilmington (Calif.) refinery staff as a chemist. Before that, he held positions in San Francisco, New York and the Martinez (Calif.) refinery. He was appointed to his present position in 1956.

Dr. Medlin received his B.S. degree in chemistry from the University of California in 1932 and took his doctorate at the California Institute of Technology in 1935. He is a member of the American Institute of Chemical Engineers.

NEW JERSEY ZINC

The following personnel changes in the zinc and titanium consuming fields have been announced.

Harold R. Frasure will take up his duties at Cincinnati and will cover the Columbus, Dayton and Indianapolis areas as well.

Stanley E. Moore joins the Chicago sales office and his territory will include the Minneapolis-St. Paul area.

John B. McCarthy will make his headquarters at the Los Angeles sales office.

Walter E. Menhinick, who has been a member of the Chicago office, is transferred to St. Louis. He will also cover the Kansas City and Louisville areas.

HEYDEN NEWPORT

Charles H. Shields, Jr., has been named supervisor of new product development, it has been announced.

Mr. Shields will be responsible for coordinating all activities relating to initial marketing of new products.

Since 1957, Mr. Shields has been engaged in market development for the company's newer organic chemicals. He was previously associated with General Electric Company as a product engineer.

Mr. Shields was graduated from the Polytechnic Institute of Brooklyn in 1951 with a Bachelor of Chemical Engineering degree.

ALLIED CHEMICAL

John L. Waldo has been appointed manager of dyestuff sales, it has been announced.

Mr. Waldo attended the University of California at Berkeley, California, and the Philadelphia Textile Institute before joining the firm in 1937 in the New York sales department.

AMERICAN MINERAL SPIRITS

William M. Harris has been named controller it has been announced. Also announced was the appointment of **Marc A. Law, Jr.** as western operations manager and **Andrew Vargo** as eastern operations manager, both under **A. S. Hoyer,** assistant vice president.

WESTERN PETROCHEMICAL

William W. Sellew Jr., has been elected chairman of the board of directors, it has been announced.

Mr. Sellew is a graduate of Amherst College and Columbia University.

COAST

Edward L. Kent, Jr. has been named western division manager it has been announced. Mr. Kent is chairman of the Registration Subcommittee of the Denver Conference of National Association of Corrosion Engineers.

BALTIMORE PAINT

Henry C. Ritz has been appointed assistant to the president, it has been announced.

In his new capacity, Mr. Ritz will be in complete charge of all trade sales operations for the firm and its subsidiaries.

FULLER

Don Dean has been appointed manager of the industrial and aircraft sales division, it has been announced. Mr. Dean succeeds **Gloyd T. Stankard** who retires September 1 after 37 years service with the company.

GENERAL MILLS

Harry G. Simmerman has joined the chemical engineering staff it has been announced.

Mr. Simmerman graduated from the University of Wisconsin in 1955.

TITANIUM

Charles L. Novak will be affiliated with the New York sales staff in New York City it has been announced. He is a graduate of Kansas Wesleyan University.

Thomas T. Wisner will join the north central sales staff and will serve the Cleveland area, it has also been announced. Mr. Wisner started with the firm in March, 1959, as a sales trainee. He was graduated from Allegheny College.

ALLIED CHEMICAL CANADA

Dr. Oliver M. Morgan has been appointed to the post of assistant to the executive vice president, it has been announced.

Dr. Morgan has been director of chemical sales since 1955.

He attended the University of Western Ontario at London, Ont., where he received a B. A. degree in Chemistry in 1927 and an M. A. degree the following year. He took his doctorate in physical chemistry at McGill University at Montreal in 1930.

From 1930-34 he was employed as a research chemist at the National Research Council of Canada at Ottawa. He came to the United States in 1934 when he became a research chemist at the Buffalo plant of the firm's Aniline Division. He was consequently named manager of detergent sales and later assistant domestic sales manager.

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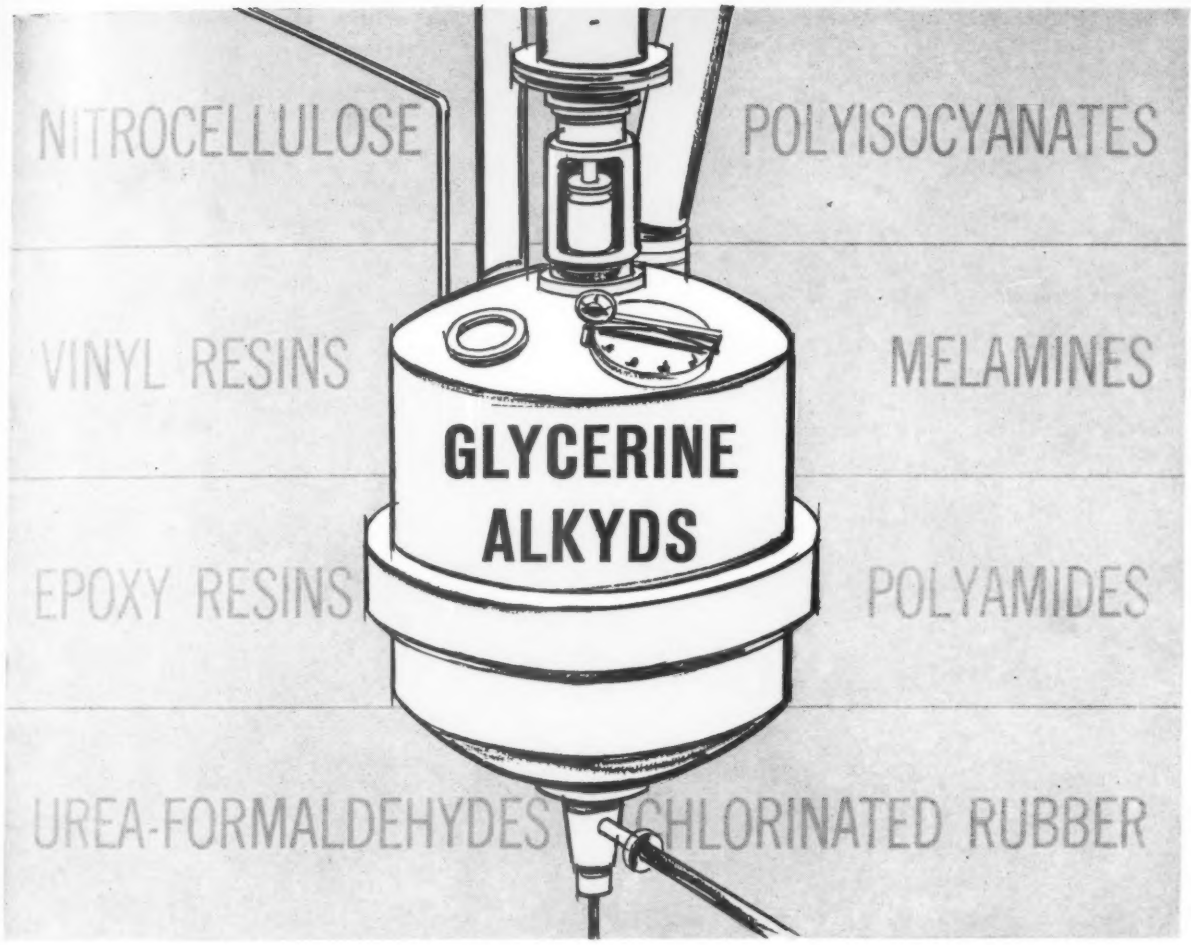

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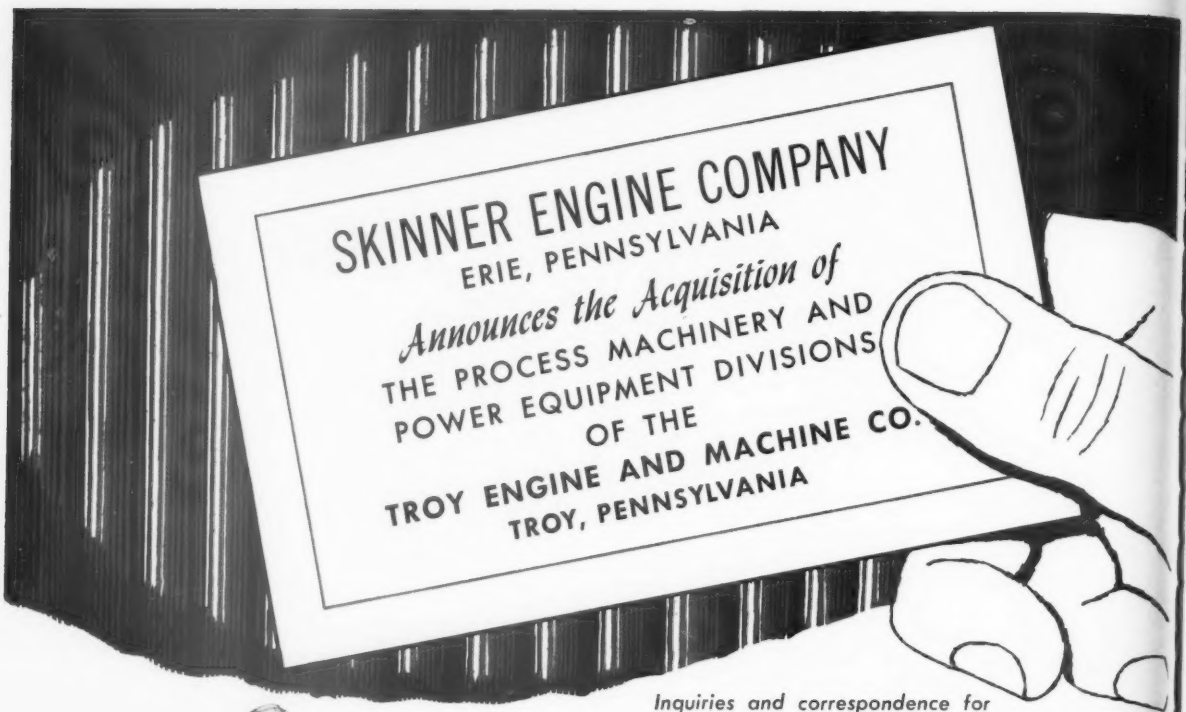

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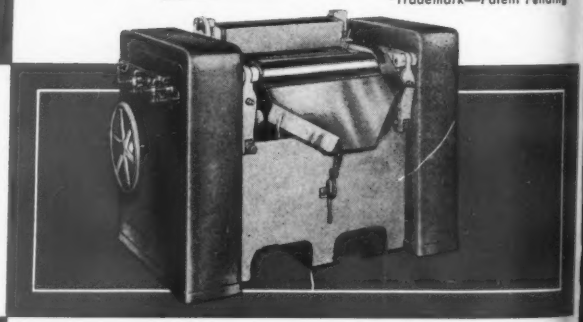

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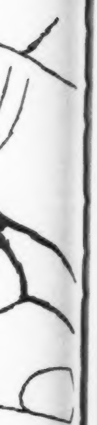

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